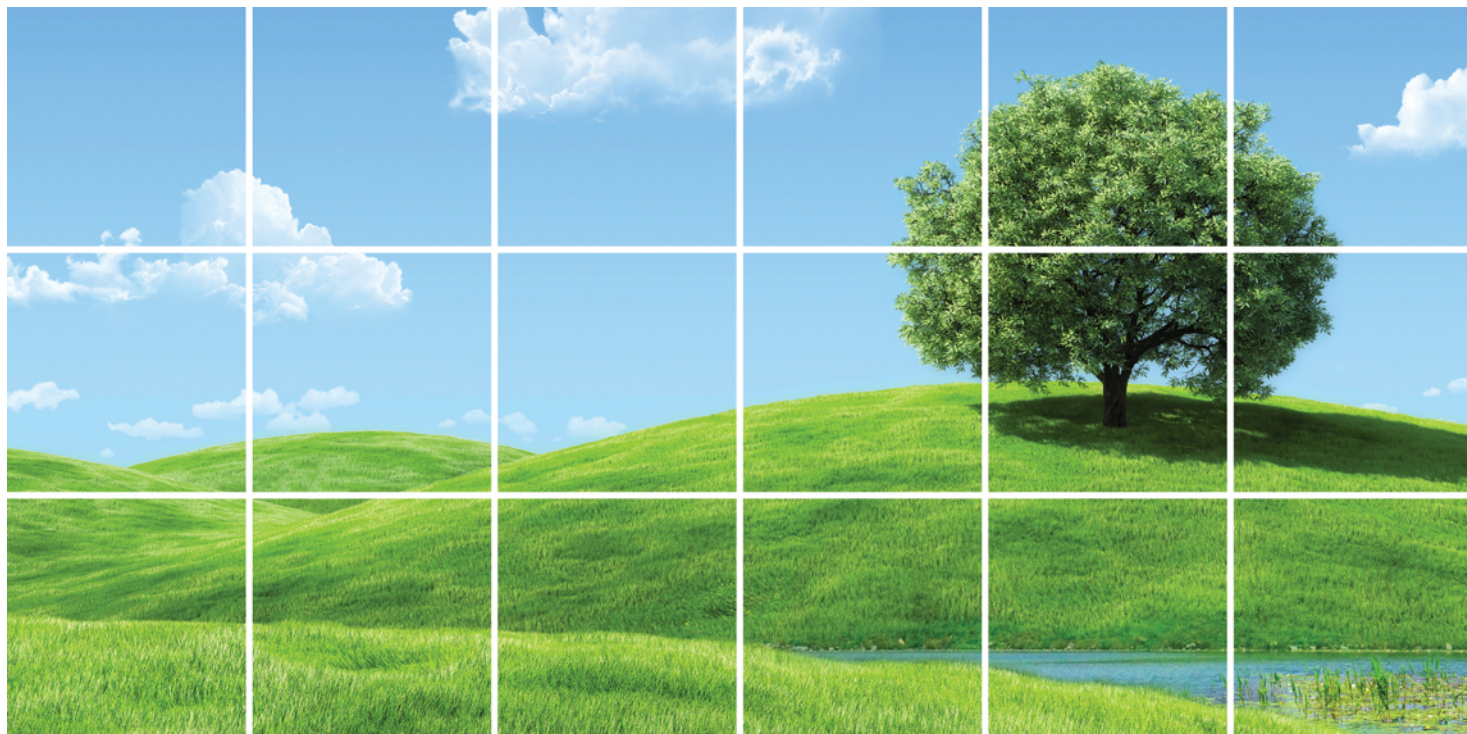




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# INTERIM REMEDIAL ACTION REPORT

OPERABLE UNIT-3 (OFF-SITE  
GROUNDWATER)

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## LIST OF ACRONYMS

1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethylene
1,1,1-TCA	1,1,1-Trichloroethane
1,2-DCE	1,2-Dichloroethylene (total)
ANSI	American National Standards Institute
AOC	Area of Concern
ARAR	Applicable, Relevant, or Appropriate Requirements
BCS	Below Ground Surface
BIL	Basic Impulse Insulation Level
BRP	Beyond Ruco Property
BWD	Bethpage Water District
CDM	Camp, Dresser & McKee
cis-1,2-DCE	cis-1,2-Dichloroethylene
CFM	Cubic Feet per Minute
CQAP	Construction Quality Assurance Plan
CY	Cubic Yards
DAP	Diammonium Phosphate
DEC	New York State Department of Environmental Conservation
DO	Dissolved Oxygen
EPA	United States Environmental Protection Agency
FS	Feasibility Study
gph	Gallons per Hour
gpm	Gallons per Minute
GSHI	Glenn Springs Holdings, Inc.
HASP	Health and Safety Plan
HDPE	High Density Polyethylene
HID	High Intensity Discharge
HMI	Human Machine Interface
Hooker/Ruco Site	Hooker Chemical/Ruco Polymers Superfund Site
HVAC	Heating Ventilation Air Conditioning
Hz	Hertz
ICM	Interim Corrective Measure
IEEE	Institute of Electrical and Electronics Engineers
IRAR	Interim Remedial Action Report

## LIST OF ACRONYMS

IRM	Interim Remedial Measure
LFP	Low Flow Purging
MCL	Maximum Contaminant Levels
mg/L	Milligrams per Liter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
N	Nitrogen
NAPL	Non-Aqueous Phase Liquid
NASA	National Aeronautics and Space Administration
Navy	Naval Weapons Industrial Reserve Plant
Northrop	Northrop/Grumman Aerospace Corporation
NCDPW	Nassau County Department of Public Works
NCDH	Nassau County Department of Health
NFPA	National Fire Protection Association
NTU	Nephelometric Turbidity Unit
O,M &M	Operation, Maintenance, and Monitoring
ORP	Oxidation Reduction Potential
OU-1	Operable Unit - 1
OU-2	Operable Unit - 2
OU-3	Operable Unit - 3
OxyChem	Occidental Chemical Corporation
P	Phosphorus
PAHs	Polyaromatic Hydrocarbons
PC	Personal Computer
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PDB	Passive Diffusion Bag
PDIR	OU-3 Predesign Information Report
PID	Photoionization Detector
PID loop	Proportional/Integral/Derivative Loop
PLC	Programmable Logic Controller
ppm	Parts per million
PRAP	Proposed Remedial Action Plan
psi	pounds per square inch
psig	pounds per square inch gauge

## LIST OF ACRONYMS

PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RM	Remedial Measure
ROD	Record of Decision
scfm	Standard Cubic Feet Per Minute
SGC	Short-Term Guideline Concentration
SOW	Scope of Work
SVOCs	Semi-Volatile Organic Compounds
TCE	Trichloroethylene
TCL	Target Compound List
TICs	Tentatively Identified Compounds
TOC	Total Organic Carbon
TVOC	Total Volatile Organic Compounds
µg/L	Micrograms per Liter
ug/m <sup>3</sup>	Micrograms per cubic meter
USGS	U.S. Geologic Survey
UST	Underground Storage Tank
VAC	Volts Alternating Current
VCM	Vinyl Chloride Monomer
VFD	Variable Frequency Drive
VOCs	Volatile Organic Compounds
WPCP	Water Pollution Control Plant

## **1.0     INTRODUCTION**

### **1.1         PURPOSE OF REPORT**

This report has been prepared on behalf of Glenn Springs Holdings, Inc. (GSHI) and presents the Interim Remedial Action Report (IRAR) for the in situ bioremediation of the off-site groundwater (i.e., Operable Unit-3 [OU-3]) at the Hooker Chemical/Ruco Polymers Superfund Site (Hooker/Ruco Site) located in Hicksville, New York. This Remedial Action is designed to address the contaminated groundwater originating from the Hooker/Ruco Site. The contaminated groundwater primarily consists of vinyl chloride monomer (VCM) although other constituents, including PCE and TCE, are present. The VCM has to some extent comingled with chemicals released from other adjacent and upgradient sites and has been labeled as a VCM subplume that exists within the Regional Groundwater Plume. Although chemicals from other sites co-exist with the VCM, the VCM subplume that originates from the Hooker/Ruco Site can be distinctly and separately identified along its track through the Regional Groundwater Plume. The Remedial Action selected for the VCM subplume includes an air injection system to stimulate in-situ biodegradation and a supplemental pump and treat system that is operated by a neighboring industry with whom GSHI is cooperatively working to address the Regional Groundwater Plume.

### **1.2         SITE DESCRIPTION**

The Hooker/Ruco Site is a 14-acre former polymer manufacturing facility. The Site location is shown on Figure 1.1.

Commerce Street and adjacent industrial development comprise the 880-foot northern Site boundary. Along the Site's 1,000-foot eastern side is a large warehouse building formerly-owned by Northrop. A small portion of undeveloped land abuts the Site's 250-foot southern property boundary. Two active tracks of the Long Island Railroad parallel the Site's 940-foot southwestern property boundary. The Hooker/Ruco Site is bounded on the 270-foot western boundary by New South Road. The property is enclosed by a chain-link fence, which completely encompasses the Hooker/Ruco Site. Six surface-water sumps were located on the Hooker/Ruco Site along the eastern and southern property boundary. These sumps historically received process wastewater and storm water runoff. The sumps are now inactive and have been completely or partially filled. Additional details regarding the sumps are provided in Section 1.5.



The area surrounding the Hooker/Ruco Site is comprised of an industrialized corridor and residential complexes. Residential dwellings are located southwest of the Hooker/Ruco Site but the majority of the area is industrial or commercial.

Historically, the major industrial facility in the area was the Northrop manufacturing facility and airport. The Northrop plant is now shut down and Northrop has sold parcels of their property to other parties. There are many other small industries, commercial operations, residential areas, utilities, transportation corridors, and storm-water management basins in the area. Figure 1.1 shows the Hooker/Ruco Site and its surroundings.

### **1.3        SITE HISTORY**

The Hooker/Ruco Site was originally developed by Rubber Corporation of America, a small privately held company. Operations at the Site began in 1945 and included natural rubber latex storage, concentrating, and compounding. Five years later, the plant began producing small volumes of plasticizers. These activities were expanded and modified through the years. In 1956, a polyvinyl chloride (PVC) plant was built, and was initially operated under the name Insular Chemical Corporation. The plant continued in operation until 1975. Hooker Chemical Corporation purchased Rubber Corporation of America in 1965, and operated the facility as the Ruco Division. Hooker has undergone several name changes, with the current name being Occidental Chemical Corporation (OxyChem). The facility was purchased by Ruco Polymer Corporation in February 1982. The facility was thereafter operated by a privately held corporation Ruco Chemical Corporation, which is not affiliated with OxyChem. In 1998, Sybron Chemical Corporation acquired the stock of Ruco Polymer Corporation and in 2000, Bayer Corporation acquired the stock of Sybron Chemical Corporation. Operations at the facility ceased in 2002 and in 2003, Bayer Polymers LLC (n/k/a Bayer Materials Science LLC) assumed the Site. Also in 2003, Bayer demolished the Plant and is currently closing the facility under RCRA, through consultation with the New York State Department of Environmental Conservation (DEC).

### **1.4        SITE OPERATIONS**

#### **Hooker/Ruco Site**

Over the life span of the plant, various processes have been employed including the manufacturing of polyesters, polyurethanes, and specialty plasticizers. PVC was

produced at the Hooker/Ruco Site until 1975. In 1956, a partnership was formed with Ross & Roberts of Stratford, Connecticut to construct and operate a PVC production facility at the Site. This venture was known as Insular Chemical Corporation. Insular was later dissolved when Rubber Corporation of America purchased its partner's share. Today, no distinction is made between the property, which was under the control of Insular, and the property, which was owned by Rubber Corporation of America. The Hooker/Ruco Site encompasses all of this property.

Through the years in which Hooker operated the facility, various processes were employed including the manufacture of polyesters, polyurethanes, and specialty plasticizers. Other products included vinyl film, vinyl sheeting, solution polyurethanes, polyurethane latexes, and dry blends, and pelletized plastic compounds. A pilot plant produced polyester, plasticizer, and polyurethane products, and the laboratory was utilized for organic chemical synthesis and technical service.

During the 1950s and 1960s, the Ruco plant utilized three groundwater production wells to provide water to the facility. These three industrial wells correspond to the DEC well numbers 3450, 5368, and 5390. The pumped water was used for various non-contact facility processes. The total pumpage of these wells ranged from 57 gpm to 324 gpm during the 1950s and ranged from 16 gpm to 140 gpm in the 1960s. The wells were abandoned in 1970. The three wells did not exceed a depth of approximately 150 feet below ground surface (BGS). The wells were shallow by comparison to the Northrop production wells which range in depth from 357 to 570 feet BGS. Recharge basin areas were located at the south end of the Hooker/Ruco Site. Storm water runoff was directed to the basins which also received process water discharge.

The operations at the plant have resulted in releases into the groundwater which are being addressed by the remedial construction activities outlined in this report.

#### Northrop Site

The Northrop Grumman Aerospace Corporation (Northrop) plant was established in the early 1930s and developed a series of naval carrier aircraft and amphibious vehicles. During the 1940s and 1950s, the plant manufactured the Wildcat/Hellcat/Avenger series of aircraft. In the 1960s and 1970s, the plant was involved with several NASA projects including the development of the Orbiting Astronomical Observatory, the ECHO II satellite, the lunar module, and space shuttle components. The plant operations returned to the development of naval aircraft during the 1980s. The plant has been downsized since that time.

The facility included numerous buildings, 14 industrial groundwater production wells (seven on the Navy property which is located immediately adjacent to Northrop's northern property boundary) and five recharge basin areas (one on the Navy property). The pumped water was primarily used for non-contact cooling although some of the water was applied in the plant processes such as parts rinsing and bath operations. The majority of the water was discharged to the recharge basins following use. The wells were operated primarily on facility demand and, as a result, the pumping rates were highly variable throughout the year. The water usage was typically greatest during the summer months.

The operations at the Northrop plant have also resulted in releases into the groundwater which are being addressed by Northrop's remedial systems.

#### Navy Site

The Naval Weapons Industrial Reserve Plant (Navy) was established in 1933 primarily for the purpose of research prototyping, testing, design and fabrication of military aircraft. The Navy property has been used periodically to store hazardous materials and waste products prior to use or disposal. The site consists of six main buildings, a salvage storage area, Northrop's second largest recharge basin area, and seven Northrop production wells.

The operations at the Navy Site have also resulted in releases into the groundwater which are being addressed in cooperation with Northrop's remedial systems. To some extent, the releases from the Hooker/Ruco, Northrop, and Navy sites overlap with each other and with releases from other properties. However, the releases from the Hooker/Ruco Site can be isolated and identified from the other sources by the presence of VCM which is the signature compound associated with the Hooker/Ruco plant.

### **1.5      WASTEWATER DISPOSAL PRACTICES**

The following descriptions of wastewater disposal practices to the Hooker/Ruco Site sumps are excerpted from the report entitled "Draft Remedial Investigation Report, Hooker/Ruco Site" dated April 1990 (revised August 1992) hereinafter referred to as the 1992 RI Report. Additional details regarding the discharges are presented in the 1992 RI Report.

### **1.5.1      SUMP 1**

From 1951 to 1974, process wastewater from Hooker/Ruco's ester production was fed to the ester plant recharge basin (Sump 1). After 1975, the waste stream was incinerated on site. Sump 1 continued to receive discharge from the floor drains in the pilot plant until 1976. The process wastewater that at one time entered the sump contained one to ten percent mixed glycols and alcohols. It also contained organic acids such as adipic, trimellitic, phthalic and isophthalic and perchloroethylene (PCE) and at times, methanol.

Sump 1 has been partially backfilled and contained a series of six concrete settling basins which have been removed.

### **1.5.2      SUMP 2**

Sump 2 received the overflow from Sump 1, as well as stormwater runoff and, therefore, received the same waste products as Sump 1, but in smaller quantities.

### **1.5.3      SUMP 3**

Sump 3 received the surface-water runoff from a large part of the plant, including most of the manufacturing areas. There are no direct process waste lines to this sump. Past activities in and around the pilot plant resulted in the release of polychlorinated biphenyls (PCBs) to the soils immediately adjacent to the building (Direct Spill Area). Surface-water runoff and truck traffic dispersed the PCBs to the surficial soils around the Pilot Plant (Transport Related Areas) and to Sump 3. The extent of PCBs in site soils was delineated to a level of 10 parts per million (ppm) by sampling and analysis.

The PCB soils were designated as Operable Unit-2 (OU-2) by the EPA. A FS examining remedial alternatives for OU-2 was prepared and submitted to and approved by the EPA in 1990. The remedial action, which consisted of the excavation and off-Site treatment/disposal of soils with PCB concentrations in excess of 10 ppm, was performed between May 1992 and March 1993 in accordance with the Record of Decision (ROD) and Unilateral Administrative Order issued by the EPA. Additional details regarding the remediation can be found in the Final Remedial Action report for OU-2, which was approved by the EPA in March 1993.



#### **1.5.4      SUMPS 4, 5, AND 6**

Sumps 4, 5, and 6 received the waste streams from Plant 2 processes. Sumps 4 and 5 were the primary recipients of the waste streams, with Sump 6 added in 1962 to handle overflow caused by plugging of Sumps 4 and 5. Sump 6, for a relatively short period of time, received only intermittent discharges. The latex and latex compounding processes were in operation from 1945 until 1971. The wastewater contained small quantities of styrene and butadiene. From 1956 until 1975, the facility produced PVC. Wastes from this process were discharged to Sumps 4, 5, and 6. Each year, about two million gallons of process wastewater were discharged to the sumps. Leaving the process, the wastewater stream probably contained 500 to 1,200 ppm of dissolved organics.

An estimate of the breakdown of the organics based on a typical copolymer formulation may be 2 to 3 ppm VCM, 100 to 175 ppm gelatin, 100 to 175 ppm methocel (a soluble form of cellulose), 50 to 100 ppm barium-cadmium stabilizer, a trace of trichloroethylene (TCE) and lauric acid, about 100 ppm of sodium acetate/bicarbonate and 250 to 650 ppm of vinyl acetate.

Sumps 4, 5, and 6 have since been completely backfilled. Additional details regarding the sumps are presented in the 1992 RI Report. The locations of the former and existing sumps are shown on Figure 2.1.

#### **1.5.5      UNDERGROUND STORAGE TANKS**

All underground storage tanks were removed prior to 1988 by Ruco Polymers. No records were kept of their condition upon removal. No leak testing was performed, and, with the exception of soil removed from around the fuel oil tanks, there is no record of soil removed from around the tanks. Additional details regarding the USTs are presented in the 1992 RI Report.

### **1.6          REGULATORY AND ENFORCEMENT HISTORY**

Several environmental investigations have been conducted at the Hooker/Ruco Site since 1978. Originally, efforts were directed toward understanding past manufacturing processes, waste generation, and waste disposal. A site background report was prepared in July 1981. This report presented the Hooker/Ruco Site in the context of its surroundings and examined waste disposal, regional geology and hydrogeology, regional groundwater withdrawals, and groundwater quality.

At that time, the DEC was the lead government agency. A work plan for conducting a soils and groundwater investigation was submitted to the DEC in April 1983. By June 21, 1983, the plan had been approved and the investigation commenced. The investigation consisted of the drilling and installation of six well clusters at locations downgradient of suspected areas of waste disposal, and the drilling and sampling of two deep test borings in formerly operating sumps. The results of this study were presented in a report entitled "Report of Groundwater & Soils Investigation at the Former Ruco Division Plant Site, Hicksville, New York", dated August 1984.

In July 1987, EPA sent OxyChem a request for information on the Hooker/Ruco Site. A response to the EPA request for information was submitted in September 1988. OxyChem entered into an Administrative Order on Consent with EPA in September 1988. Subsequently, a Field Operations Plan, based on an EPA Work Plan, was submitted for EPA review in October 1988.

Between September 1989 and March 1990, a RI was conducted at the Hooker/Ruco Site. The investigation included a soil-vapor study, electromagnetic terrain conductivity survey, recharge basin (sump) water and sediment sampling, shallow and deep soil sampling and groundwater sampling. A total of 134 soil samples were collected from 50 borings for analysis of target compound list (TCL) parameters and tentatively identified compounds (TICs). Eight deep wells and 14 shallow wells were installed on and off site to complement the existing 12 on-site wells. Two off-site piezometers were installed to help define the groundwater flow pattern. Thirty-nine new and existing wells were sampled and analyzed for TCL/TIC parameters. A Remedial Investigation (RI) and Feasibility Study (FS) were completed for the Hooker/Ruco Site in August 1992 and August 1993, respectively.

The risks for exposure to groundwater at the Hooker/Ruco Site boundary were calculated in the report entitled "Revised Final Risk Assessment and Fate and Transport Report, Operable Unit 1" dated October 1992.

The calculated risks showed that for current residents, the carcinogenic and non-carcinogenic risks were below levels of concern and that for future construction workers (e.g., for remedial action) and trespass children, the risks were within or below the levels of concern (i.e.,  $10^{-4}$  to  $10^{-6}$  for carcinogenic risk and Hazard Index  $<1$  for non-carcinogenic risk).

The calculated risks for future residents showed that the majority of the carcinogenic risk (65 to 99 percent) was attributed to potential exposure to VCM. It is reasonable to

assume that if the risk attributable to VCM is controlled, the risks contributed by the other chemicals of concern (e.g., PCE) would also be controlled. Thus the remedial efforts associated with the Hooker/Ruco Site have been focused on the elimination of VCM. It has been accepted that by remediating the VCM, which is the primary compound of concern and the most prevalent, any other compounds released from the Hooker/Ruco Site will be simultaneously addressed. For example, trace levels of PCE and TCE that may have been released from the Hooker/Ruco Site will either be treated by the anaerobic conditions that are created by the VCM; natural attenuation along the flow path within the groundwater; or be captured by the Northrop pump and treat system.

In April 1994, OxyChem initiated a program to investigate groundwater conditions beyond the Ruco property (BRP). The activities were described in the plan entitled "Work Plan for Groundwater Investigations Beyond the Ruco Property, August 1994" (BRP Work Plan) and in a subsequent Addendum dated September 1995. The results were provided in the report entitled "Remedial Investigation Report, Operable Unit-3" dated July 2000.

The adjacent aerospace manufacturing facility operated by Northrop has also impacted the Bethpage regional aquifer and has conducted an RI/FS pursuant to a Consent Agreement with the DEC. Adjacent to the Northrop site is the Navy site, which is also the subject of an RI/FS under the Comprehensive Long-Term Environmental Active Navy Program. The RI's for the Northrop and Navy sites were completed in September 1994 and October 1993, respectively. Based on the findings of these RI's, Northrop has implemented an Interim Remedial Measure (IRM) which includes treatment at the Bethpage Water District (BWD) wells south (downgradient) of the Northrop site and the pumping and treatment of groundwater from Northrop on-site production wells GP-1, GP-3, ONCT-1D, ONCT-2D, and ONCT-3D.

Groundwater sampling conducted as part of the RIs for the Hooker/Ruco, Northrop and Navy sites shows that the primary chemicals in the groundwater based on concentration and frequency of detection for the Northrop and Navy Sites are chlorinated VOCs, mainly TCE, PCE, and to a lesser degree 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethylene (1,2-DCE), 1,1-dichloroethylene (1,1-DCE), and 1,1-dichloroethane (1,1-DCA). The primary groundwater chemical for the Hooker/Ruco Site is VCM. TCE, PCE, 1,1,1-TCA, 1,2-DCE, 1,1-DCE, and 1,1-DCA are also present in the groundwater. Secondary groundwater chemicals detected at the sites are as follows:

- i) Navy: Semi-Volatile Organic Compounds (SVOCs) including bis(2-ethylhexyl)phthalate, di-n-butylphthalate, di-n-octylphthalate,

2-methylphenol, 4-methylphenol; 2,4-dimethylphenol, naphthalene, acenaphthylene, fluoranthene, benzo(b)fluoranthene, and pyrene; inorganics including cadmium, chromium, and thallium, and TICs including polyaromatic hydrocarbons (PAHs), substituted benzenes, alkanes, substituted phenols, and carboxylic acids

- ii) Northrop: inorganics including arsenic, cadmium, and chromium
- iii) Hooker/Ruco: TICs including glycols, diols, and acids

Because the impacts on the Bethpage regional aquifer by the three adjacent facilities have intermingled to some degree, it was agreed by all parties in the spring of 1995 that a regional evaluation and remedy be developed to address the combined TVOC conditions created. However, in order to expedite the program, a decision was made in November 1998 to separate the RI/FS process into two parts. The DEC is working with Northrop and the Navy to address the overall TVOC plume while the EPA is working with GSHI to address the VCM subplume. While these plumes do overlap to some extent, the VCM subplume emanating from the Hooker/Ruco Site remains separate and identifiable through the geologic layers within the aquifer.

The DEC, Northrop, and Navy prepared a Groundwater FS (dated November 2000) which addressed the regional TVOC groundwater plume. A Proposed Remedial Action Plan (PRAP) was issued by the DEC in November 2000 and the ROD for the regional TVOC groundwater plume (designated as Operable Unit-2 for the Northrop/Navy sites by the DEC) was issued on April 24, 2001. The Remedial Measure (RM) described in the Northrop/Navy OU-2 ROD included continued operation of the IRM groundwater extraction and treatment system and the wellhead treatment of impacted public water supply wells. Northrop and the Navy are continuing to investigate the areal and vertical extent of the TVOC plume further to the south of the RM using vertical profile borings. The data from these borings have been provided to GSHI to assist in the understanding of the regional conditions.

Computer simulations presented in the OU-3 RI Report for the Hooker/Ruco Site show that the Northrop RM would fully capture the VCM subplume if the VCM was allowed to continue to migrate with the natural groundwater flow. Thus, any remedial actions that are implemented by GSHI to address the VCM subplume as a separate component of the TVOC plume is an enhancement to an already effective remedy.

Data from the various studies that have been performed provided the additional data on the regional groundwater conditions that were necessary to evaluate effective remedial action alternatives for the VCM subplume. The evaluation of remedial action



alternatives was presented in the document entitled "Feasibility Study for Operable Unit-3" (OU-3 FS Report), dated July 2000.

The objective of the OU-3 FS Report was to develop, evaluate, and select potential remedial alternatives that can be implemented to protect human health and the environment from risks associated with the groundwater containing elevated VCM as well as any other chemicals in the VCM subplume that are attributable to the Hooker/Ruco Site. For the purposes of the FS, reference to the VCM subplume is intended to include all of the chemicals within the VCM subplume that are attributed to the Hooker/Ruco Site. It is recognized that VCM is the primary compound although other compounds are included in the subplume.

Based on the evaluation presented in the OU-3 FS Report, the EPA issued a PRAP for the VCM subplume on July 25, 2000. The PRAP's preferred remedial action incorporates the use of biosparging within the VCM subplume with the contingency of a pump and treat system if biosparging is shown not to be able to achieve the remedial action objectives in a reasonable time frame. The Record of Decision for OU-3 was finalized by the EPA on September 29, 2000. The selected remedial action incorporates the use of in situ bioremediation treatment of the VCM subplume using biosparging (with supplemental nutrient addition, if necessary). Furthermore, the OU-3 ROD retained the contingency pump and treat remedy (if needed) as described in the OU-3 PRAP. The Administrative Order for the Remedial Design and Remedial Action (RD/RA) for the VCM subplume (i.e., Index No. II-CERCLA-02-2001-2018) was received by GSHI on May 4, 2001.

To obtain the information needed to assist in the design of the OU-3 biosparge remedy, GSHI undertook a number of predesign activities. The scope for the predesign work was primarily outlined in the document entitled "OU-3 Predesign Activity Scope of Work" (OU-3 Predesign SOW), originally submitted in June 1999. A revised Scope of Work was submitted on January 23, 2002 and approved by the EPA on February 8, 2002. The results of the work were provided in the report entitled "Off-site Groundwater Predesign Information Report" (PDIR) dated November 22, 2002. The PDIR was approved by the EPA on July 29, 2003.

## **1.7        GEOLOGY/HYDROGEOLOGY**

### **1.7.1      GEOLOGY/HYDROGEOLOGY**

In summary, the regional stratigraphy generally consists of unconsolidated overburden deposits of clay, silt, sand, and gravel overlying a shist and gneiss bedrock. The overburden units, in order of increasing depth, are:

- i)        Upper Glacial aquifer (medium to coarse sand, 75± feet thick)
- ii)       Magothy aquifer (fine to medium sand with interbedded discontinuous layers of coarse sand and silty clay, maximum thickness 650± feet)
- iii)      Raritan Confining Unit (silty clay, 175± feet thick)
- iv)      Lloyd aquifer (fine to coarse sand, 300± feet thick)

In the vicinity of the Hooker/Ruco Site, the overburden stratigraphy consists of the same four units. The Upper Glacial Aquifer ranges in thickness from 30 to 70 feet. The Magothy Aquifer underlies the Upper Glacial Aquifer. The Magothy Aquifer is underlain by the Raritan Confining Unit, the top of which is the vertical extent of the hydrogeologic regime evaluated during the OU-3 RI and 2002 investigations. In general, the stratigraphic logs indicate the presence of coarse sand and gravel material to depths of approximately 70 feet to 100 feet BGS in the vicinity of the Hooker/Ruco Site. This material is representative of the coarse deposits of the Upper Glacial aquifer. Below this depth, interbedded layers of fine sands, silts, sandy clays, and clays become dominant although some layers of coarse material are evident. The finer deposits interbedded with clay layers or lenses are characteristic of the deposits that comprise the Magothy aquifer.

Below the Upper Glacial deposits, continuous fine-grained (e.g., clay) layers cannot be identified between more than two adjacent monitoring wells. In some cases, it is difficult to correlate the fine-grained layers between immediately adjacent wells. The intermittent nature of the fine-grained layers is expected to strongly influence groundwater flow paths in both the horizontal and vertical directions. The groundwater flow paths are expected to vary significantly around the discontinuous fine-grained lenses as the more permeable pathways are sought.

### **1.7.2      GROUNDWATER LEVELS**

The water table generally is located near the base of the Upper Glacial aquifer and the Upper Glacial aquifer is largely unsaturated in the vicinity of the Hooker/Ruco Site. Groundwater in the Upper Glacial Aquifer and Magothy Aquifer generally flows from north to south with local variations due to the effect of pumping wells and recharge basins.

Pumping of the Northrop production wells would have reinforced (increased) the natural north to south hydraulic gradient from the Hooker/Ruco Site and the northern portions of the Northrop and Navy sites, thereby drawing chemicals from these areas to the Northrop production wells keeping the chemicals on the Northrop and Navy sites. Therefore, the chemicals in groundwater at the Hooker/Ruco Site and northern portions of the Northrop and Navy sites would have principally migrated from north to south, thereby preventing extensive lateral migration to the west and the east from the area of the three sites.

### **1.7.3      GROUNDWATER CHEMICALS RESULTS**

The groundwater analytical results assessment presented in the following section focuses on the known extent of PCE, TCE, and VCM in the area south of the Hooker/Ruco Site. These three compounds are those most frequently detected although the VCM subplume is the primary topic of this report. The data presented include the information from the wells installed in 2002 and further refines the understanding of the horizontal and vertical extent of the VCM subplume.

#### **1.7.3.1    RI GROUNDWATER RESULTS**

The OU-3 RI results indicated that the Hooker/Ruco Site is not the source of chemicals to the Hicksville municipal wells located to the west and northwest of the Hooker/Ruco Site.

As presented in the OU-3 RI Report, the pattern of VCM analytical results with time for GP-6, GP-8, and GP-14 showed that when these three wells were pumping, they reinforced the natural north to south groundwater gradient and drew VCM toward them from areas to the north and northwest of these wells. These pumping wells also helped draw the VCM to deeper portions of the aquifer. This pumping scenario resulted in the creation of two prongs of VCM migration, one to the area of GP-6 and the other to

the area of wells GP-8 and GP-14. This occurred until 1992 when these wells were turned off. It is believed that chemicals potentially attributable to the Hooker/Ruco Site migrated to and were captured by these wells prior to 1992 and that the most southerly extent of the VCM subplume prior to 1992 was GP-6.

When pumping stopped at GP-6, GP-8, and GP-14 in 1992, the groundwater flow system returned to a more natural condition in the areas of these wells. However, the natural north to south gradient was still being maintained by the pumping of GP-1 and GP-3 which are located further downgradient. With the pumps at GP-6, GP-8 and GP-14 no longer drawing the VCM toward them, the chemicals in the VCM subplume have migrated with the natural southerly groundwater flow and are converging on the flow paths associated with the pumping of Northrop wells GP-1 and GP-3.

This is supported by the absence of VCM in the well nests of MW-56 and MW-57 and by the particle track simulations presented in the RI Report. The particle track simulations showed that particles released from all intervals for the entire Hooker/Ruco Site will be captured by the Northrop RM. The particle track simulations also showed that chemically impacted groundwater underlying the Hooker/Ruco Site does not flow to the Hicksville wells.

#### **1.7.3.2     PRE-DESIGN INVESTIGATION RESULTS**

The results of the Pre-Design Investigation indicated that the groundwater in the regional TVOC plume is generally aerobic and natural attenuation of VCM in the groundwater is occurring. However, in the VCM subplume, the available oxygen has been depleted and needs to be replenished in order for VCM degradation to continue. In addition, continued degradation in the VCM subplume may become limited by the lack of carbon sources and potentially by a lack of phosphorus. Natural attenuation of VCM by biodegradation has occurred in the vicinity of monitoring wells MW-50J1, MW-50J2, MW-52S, and MW-52I. PCE and TCE biodegradation is limited, but has occurred historically as demonstrated by the presence of cis-1,2-DCE in the PCE/TCE plume wells, VCM subplume boundary wells, and downgradient wells. This slow degradation is likely due to the presence of aerobic conditions which inhibits PCE degradation and retards TCE degradation. Natural attenuation of VCM by the oxidation pathway will be enhanced by the addition of dissolved oxygen (DO) and, if needed, carbon sources in the VCM subplume.

In summary, the data from the Pre-Design Investigation led to the following key observations:

- i) The distribution of redox parameters indicates that, in general, groundwater in the regional area is aerobic and biodegradation of VCM is occurring.
- ii) The redox parameters in the center of the VCM subplume indicate that the groundwater in this area is in a reducing state (anaerobic).
- iii) Natural attenuation of VCM by the aerobic biodegradation pathway will be enhanced by the addition of DO and, if needed, carbon sources in the VCM subplume.
- iv) VCM anaerobic degradation products (ethane and ethene) were observed at monitoring wells MW-50J1, MW-50J2, MW-52S, and MW-52I, indicating that anaerobic biodegradation of VCM by reductive dehalogenation has occurred in the VCM subplume.
- v) The PCE and TCE degradation product cis-1,2-DCE was observed in PCE/TCE plume wells and downgradient monitoring wells in association with the parent compounds, indicating that degradation of PCE and TCE is slowly occurring in the area due to the predominantly aerobic conditions.
- vi) The DCE may be degrading directly to CO<sub>2</sub>, chloride, and water because of the aerobic conditions. This is likely why VCM is not being detected outside the limits of the VCM subplume.

The results of the natural attenuation evaluations indicated that destructive natural attenuation processes have contributed to the reductions in PCE, TCE, and VCM concentrations over time. They have resulted in the biotransformation of some PCE, TCE, and VCM to relatively innocuous compounds (i.e., ethene, ethane, methane, chloride, carbon dioxide and water). However, continued PCE and TCE degradation will be slow to occur due to the predominantly aerobic conditions in the TVOC plume. Similarly, continued VCM degradation in the VCM subplume will be slow to occur due to the predominantly anaerobic conditions therein. VCM degradation can be significantly enhanced by the addition of oxygen and may be further enhanced by the addition of carbon sources and nutrients into the VCM subplume.

The principal results obtained from the injection testing were:

- i) The formation has the capacity to easily accept the planned air flow rates.
- ii) The addition of both liquid and gas amendments were practical.
- iii) Air plugging of the formation is unlikely to occur.

- iv) DO can permeate into silty intervals that do not accept injected air directly.
- v) Water injection can be used to redevelop wells that decrease in air capacity.
- vi) No detectable vapors should reach the ground surface.
- vii) The injection tests were not run long enough to establish an area of influence for an individual well. Such establishment was not an objective of the testing performed. The design strategy was to install and operate a Pilot System over a longer term to determine an effective well spacing for a full scale remedial system.

While the impacts to soils at the Site have been addressed through remedial activities, some impacts due to the historic chemical releases persist in the groundwater. The groundwater impact has migrated off Site and is now commingled within the regional plume. The studies that have been performed over the years have defined the horizontal and vertical extent of the chemical plume emanating from the Hooker/Ruco Site which is primarily characterized as a VCM plume. The ROD that was issued for the Site in 2000 determined that the appropriate remedy for the off-site groundwater plume of VCM (i.e., OU-3) would incorporate the use of in situ biosparging. The ROD also included a contingency remedy involving pump and treat technologies if the biosparging was not able to achieve the remedial action objectives in a reasonable time frame.

Considering that the VCM has migrated to recovery well GP-3 on Northrop property, the remedy has evolved into a dual remediation program involving both biosparge and pump/treat technologies for the northern and southern portions of the VCM plume, respectively. GSHI has worked cooperatively with Northrop to address the leading (southernmost) portion of the VCM plume using Northrop's existing GP-1/GP-3 pump and treat facility. Northrop's facility is being operated to address Northrop's groundwater plume of VOCs. With some modification of the Northrop treatment facility, the facility capably addresses the commingled Hooker/Ruco Site VCM plume and the Northrop VOC plume.

While the pump and treat technology will capture and remove the leading portion of the VCM subplume, the primary remedial technology for the VCM subplume remains in situ bioremediation promoted by the installation of two fence lines (middle and north) of air injection wells in the north/central portion of the VCM subplume. The injection of air into the middle of the VCM subplume will increase the rate of natural degradation of the VCM into inert compounds as the subplume continues to migrate south toward the Northrop GP-1/GP-3 pumping system. The air injection in the two fence lines promotes sufficient degradation to eliminate the need for any additional

injection wells in the southern portion of the subplume. In conjunction with the continued operation of Northrop's pump and treat system, the biosparge system eliminates the need for any additional groundwater treatment of VCM downgradient of the Northrop system.

The estimated areal limit of the VCM subplume prior to 2005 is shown on Figure 1.2 and a cross-section of the VCM subplume prior to 2005 from the Site through to the vicinity of GP-1/GP-3 is shown on Figure 1.3. The estimated areal limit of the VCM subplume in 2011 is shown on Figure 1.4. The VCM concentrations on Figure 1.4 show the effectiveness of the Biosparge Pilot System in reducing VCM concentrations and also the effect that natural attenuation has had on the size and concentrations of the VCM subplume.

The 100% Final Design Report submitted May 27, 2005 and approved July 7, 2005 presents the planned remedial components associated with the two fence lines of biosparge injection wells.

## 1.8 PRIOR REMEDIAL ACTIVITIES

Prior remedial activities have been performed for Operable Unit 1 (OU-1) and Operable Unit 2 (OU-2) at the Site.

### 1.8.1 OPERABLE UNIT 1

A summary of the remedial actives performed by GSHI for OU-1 are listed below:

<i>Date</i>	<i>Activities</i>
November 2000	<ul style="list-style-type: none"> <li>Concrete tank removed from Sump 1</li> <li>Excavated and off-site disposal of 327 tons of PCB – impacted soil</li> <li>Installation of a soil flushing system in Sump 1 to enhance the cleanup of the remaining minimal chemical presence in the unsaturated soils (PCE and di-n-butyl phthalate)</li> </ul>
December 2001	
August 2002, March 2003	Flushing of Sump 1 using approximately 16,000 US gallons of potable water for each event which reduced the
March 2004, March 2005	

chemical concentrations in the soil but did not result in a measureable increase in chemical concentrations in the underlying groundwater

March 16, 2006	Final OU-1 Sampling and Evaluation document submitted to the EPA
September 28, 2007	Remedial Action Report for Operable Unit One approved by the EPA

### 1.8.2 OPERABLE UNIT 2

A summary of the remedial activities performed by GSHI are listed below.

<i>Date</i>	<i>Activities</i>
May to September 1992	<ul style="list-style-type: none"><li>• Approximately 52 cubic yards (CY) of soil with PCB concentrations exceeding 500 ppm were shipped off-site and thermally destroyed at a TSCA-permitted incineration facility</li><li>• Approximately 2,152 CY of soil with PCB concentrations between 10 and 500 ppm were shipped off-site and disposed at a TSCA permitted landfill</li></ul>
March 12, 1993	EPA approval received of Remedial Action Report for Operable Unit 2

In addition, GSHI has assisted Bayer in their closure of the Site. Remedial activities conducted at the Site by Bayer pursuant to their RCRA Corrective Action Program consist of the following:

- Removal of approximately 30 CY of PCB-impacted soil from the former electrical transformer area (AOC 39), removal of a former gasoline underground storage tank (UST) (AOC 50), and cleaning of subsurface structures as part of an initial Interim Corrective Measure in 2005
- Removal of a Underground Storage Tank encountered beneath Plant 2 (AOC 51) and an unrelated, small isolated amount of pooled non-aqueous phase liquid (NAPL) encountered beneath Plant 2 during foundation demolition activities in 2006
- Removal of approximately 670 CY of PCB-impacted soil (greater than 50 ppm) from AOC 45 as part of an ICM during 2006



- Removal of approximately 8,774 CY of PCB-impacted soil from "the eastern plant area" as part of an ICM in 2009

## 1.9 ORGANIZATION OF REPORT

This IRAR is organized as follows:

- Section 1.0 - Introduction: Discusses the purpose of the report and outlines the components of the OU-3 remedial action
- Section 2.0 - Background: Summarize requirements specified in the ROD.
- Section 3.0 - Construction Activities: Provides a step by step summary of the activities undertaken for construction and implementation of the biosparge system
- Section 4.0 - Chronology of Events: Provides a tabular summary of the major events of the remedy starting with the signing of the ROD
- Section 5.0 - Performance Standards and Construction Quality Control: Describes the overall performance of the technology in achieving cleanup goals, compliance with construction quality assurance/quality control requirements and analytical data QA/QC
- Section 6.0 - Inspections and Certification: Describe the results of Pre-Final and Final Inspections and a certification by responsible corporate official that the information contained in this report is true, accurate and complete
- Section 7.0 - Operation and Maintenance Activities: Describes the operation and maintenance of the system and the monitoring program that assesses the effectiveness of the remediation
- Section 8.0 - Observations and Lessons Learned: Describes lessons learned from operation of the Pilot System and the Biosparge System design modifications implemented
- Section 9.0 - Contact Information: Provides the contact information for GSHI, CRA, EPA, DEC and property owner representatives

## 1.10 INTERIM REMEDIAL ACTION REPORT COMPONENTS

The components of this IRAR include:

- i) As-recorded Drawings

- ii) Stratigraphy, Geophysical, and Well Instrumentation Logs
- iii) Certificates

## **2.0     BACKGROUND**

### **2.1           SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY**

The biosparge remedy was selected because it is a cost-effective and reliable measure to significantly decrease the VCM concentrations within the center of the subplume in a relatively short time frame. The remedy permanently mitigates the threat posed by VCM, and results in minimal disruption of commercial activities on or around the properties where the system is installed. The biosparge remedy along with natural attenuation removes and reduces the concentration of VCM to a level that achieves State drinking water standards or Federal MCLs.

A benefit of the biosparge remedy is that groundwater is not extracted from or discharged to the aquifer. Additionally, the construction of a treatment system, recharge basins, and force mains are not required. Therefore, the biosparge remedy results in minimal stress to the environment.

The remedy relies on the continued operation of the Northrop Treatment System to address the commingled VOC groundwater plume. This system will also prevent the subplume's further migration.

The biosparge remedy will be protective of human health and the environment, will comply with ARARs, will be cost-effective, and will utilize permanent solutions and treatment technologies to the maximum extent practicable.

### **2.2           OBJECTIVES / GOALS**

In accordance with the ROD, the major components of the remedy include:

- The use of biosparging technology in an in-situ application to enhance the VCM degradation with the goal of achieving State drinking water standards or Federal maximum contaminant levels (MCLs). Biosparging is a form of bioremediation that involves the introduction of air/oxygen into the aquifer to increase the DO content in the aquifer, which will enhance aerobic degradation of the VCM subplume. The biosparging will work in concert with natural attenuation to achieve the State drinking water standards or Federal MCLs.
- Vertical injection wells will be installed in the area of the VCM subplume to a depth of 200 to 400 ft. Additives (air/oxygen, nutrients) will be forced into the formation using either static head within the well or using pump-supplied pressure.

- A vadose zone or unsaturated zone monitoring program will be implemented to ensure that air stripping of VOCs, particularly VCM, is not occurring as a result of biosparging.
- If necessary, the selected remedy will also utilize a supplemental aerobic bioremediation technology following the biosparging treatment. Supplemental bioremediation would involve the injection of nutrients (potentially including nitrogen and phosphorus along with suitable carbon sources such as sugar byproducts) to enhance the growth and metabolic activities of indigenous microbial populations to effect the degradation of VCM in the aquifer.
- A long-term monitoring program will be developed to monitor groundwater quality in the area of the VCM subplume and to evaluate the fate and migration of VOCs southward and westward beyond the VCM subplume. The objective of the long-term monitoring program is to evaluate the effectiveness of the selected remedy.

The selected remedy is also based on the recognition that an existing groundwater extraction and treatment system (Northrop Treatment System) which is operating as an IRM at the downgradient Northrop Site is containing and remediating a commingled plume of TCE and PCE contamination from the Northrop, Navy and the Hooker/Ruco sites. EPA's selected remedy for the Hooker/Ruco Site, designated as Operable Unit Three (OU-3), together with the Northrop Treatment System, will prevent further migration of groundwater contamination and will effectively address the contamination emanating from the Hooker/Ruco Facility.

The objectives of the remediation for OU-3 at the Hooker/Ruco Site are:

1. To reduce contaminant levels in the groundwater in a timely manner after startup of the entire system to achieve State drinking water standards or Federal MCLs. It is estimated approximately 12 years will be required to achieve this objective.
2. To prevent the need for supplemental treatment at the Northrop Treatment System.
3. To protect human health and the environment from risks associated with the contaminated groundwater.

In other words, Remedial Action Objectives for groundwater are to protect human health from exposure (via ingestion, inhalation, and dermal contact) to VCM, TCE, PCE, and TICs in groundwater affected by the Hooker/Ruco Site at concentrations in excess

of New York State drinking water standards and Federal MCLs and also to restore the portion of the aquifer affected by the Hooker/Ruco Site to meet New York State Groundwater Standards and New York State and Federal MCLs in a timely manner.

Since issuance of the ROD, VCM has migrated to the Northrop well GP-3. Thus Objective 2 is no longer achievable. Modifications to the Northrop Treatment System have been implemented by GSHI (in cooperation with Northrop)\_to address the VCM pumped by GP-3.

Achievement of Objectives 1 and 3 will be accomplished using in situ bioremediation treatment of the VCM subplume using biosparging (with supplemental nutrient addition, if necessary) and natural attenuation. The ROD contained a contingency of relying solely on a pump and treat system (as is being used for the southernmost portion of the VCM subplume) if biosparging is shown not to be able to achieve the remedial action objectives in a reasonable time frame for the VCM subplume. Based on the data collected from the Pilot System, biosparging has significantly reduced VCM concentrations in a reasonable time frame. Thus, it is unlikely that the contingency will be implemented.

The primary goal as stated in the 100% Final Design Report is to create an aerobic environment to biodegrade the VCM in situ. The remedial action focuses on developing an injection system that is capable of delivering the necessary components (oxygen and, if necessary, carbon sources) to create conditions conducive to the aerobic degradation of VCM within the VCM subplume. The remedy primarily concentrates on the central core areas of the VCM subplume where elevated concentrations (typically greater than 40 ug/L) have been found to exist. Once the concentrated VCM areas have been remediated, the peripheral low concentrations are expected to be susceptible to the naturally occurring degradation conditions that exist, or will be created, in the groundwater resulting in a collapsing reduction of the VCM subplume.

The aquifer has considerable natural degradation capability as evidenced by the fact that the perimeter edges (both sides plus the top and the bottom) of the VCM subplume are being reduced by biodegradation processes. The perimeter areas have oxygen, nutrients, carbon sources, and microbes available that biodegrade these low level VCM concentrations. It is only in the core area of high VCM concentrations where the oxygen has been consumed, thus limiting the VCM biodegradation process. It is noted that the low level PCE and TCE concentrations within the VCM subplume are effectively biodegraded due to the anaerobic conditions created by the VCM. Thus PCE and TCE were also naturally treated in-situ during this process. The injection of oxygen into the central core of the VCM subplume, replenishes the oxygen supply to restart and enhance

the VCM biodegradation process after the PCE and TCE have been degraded. PCE and TCE associated with the Hooker/Ruco Site that is not degraded will be captured by the Northrop treatment system.

It was also recognized that the large plume of PCE and TCE from sources other than the Hooker/Ruco Site would also be naturally degrading to VCM. Since the Hooker/Ruco VCM subplume and the regional plumes co-exist in some areas, it would be unreasonable to expect that all of the VCM detected in the monitoring wells was sourced from the Hooker/Ruco Site. Low level VCM presence should be expected throughout the regional PCE/TCE plume. Therefore, the concentration of 40 micrograms per liter ( $\mu\text{g/L}$ ) was selected as a reasonable concentration for the biosparge system's injection wells to achieve fully expecting that natural attenuation will address any minor residual VCM concentrations, and failing that, it would be captured and treated by the Northrop GP-1/GP-3 treatment system. Further, once the high concentration portion of the VCM subplume has been addressed, it is unlikely that so much oxygen would be consumed in aerobically treating the remaining VCM that it would deplete the oxygen concentration to the point that the aquifer would again become anaerobic. Therefore, there will be sufficient oxygen available to completely biodegrade the remaining VCM as the groundwater continues its southerly migration.

The parameters to evaluate the performance of the biosparge system are:

- Dissolved Oxygen (DO): desired groundwater concentration of  $>2$  milligrams per liter
- Total Organic Carbon (TOC): desired groundwater concentration of  $5 \leq \text{TOC} \leq 10$  milligrams per liter ( $\text{mg/L}$ )
- VCM: decreasing concentrations

Of the above three parameters, the VCM concentration is the critical parameter. If the VCM concentrations are decreasing and are consistent with meeting the remedial objectives, the need to achieve the desired concentrations for DO and TOC is not imperative.

## **2.3      DESIGN BASIS**

This remedy consists of the injection of air at a rate sufficient to convert the generally anaerobic conditions in the groundwater downgradient of the injection wells located within the central core of the VCM subplume to aerobic conditions and then supply

sufficient oxygen to continue to maintain aerobic conditions as biodegradation of the chemical compounds, principally VCM, occurs. This remedy also takes into consideration the requirement that the air flow rate selected will not result in the release of VOCs to the atmosphere. If monitoring shows that biodegradation is being inhibited by insufficient TOC or nutrients, low level concentrations (approximately 5 to 10 mg/L) of a carbon source (i.e., sugar byproducts) and/or nutrient (e.g., diammonium phosphate [DAP] or a similar material) will be injected. The particle tracking results provided in the May 27, 2004 submission to the EPA showed that the entire VCM subplume will be captured by either the combined pumping of GP-1/GP-3 at pumping rates of 1,075 and 375 gallons per minute (gpm), respectively, or the pumping of GP-1 only at a pumping rate of 1,075 gpm. Thus, any amendments injected into the aquifer and not consumed, will be captured and will not impact areas outside the containment area of GP-1/GP-3.

It is noted that as the groundwater flows towards GP-3, it is anticipated that the groundwater flow paths will merge together, thereby creating better contact of the injected materials with the VCM impacted groundwater, if any, that flows between the effective radius of the individual injection wells. In addition, the injected materials will at least initially disperse both horizontally and vertically as they are injected and to some degree as southerly migration continues. This natural distribution of injected materials with the converging VCM impacted groundwater will make the remedy more effective as the groundwater continues to flow south. The monitoring described in Section 7.0 will determine achievement of the remedial goals.

It is recognized that VCM degradation will continue to occur as long as there is sufficient oxygen, carbon source, and nutrients available in the groundwater. Therefore, it is expected that VCM degradation to non-detect concentrations is possible as long as the conditions conducive to degradation are maintained.

The first step of the remediation strategy was to install a Pilot System and operate the Pilot System over a longer term to determine an effective well spacing for a full scale remedial system. The Pilot System included the control center, force main to four injection wells in the central portion of the middle fence line, four injection well nests (IW-16 through IW-19), and the monitoring wells for these injection wells (see Drawing MP-01).

The operation of the Pilot System provided the information necessary to finalize the injection well spacing and injection rates, confirmed that supplement injections are not needed, and established the other operating parameters to ensure that the rest of the full system has been properly designed and installed. This information has been compiled

since the time that the Pilot System first began operation in October 2006. The design of the final system incorporates all of the details obtained from the Pilot System and have been included in the construction of the final system which was completed in August 2012. The final system began full-time operation on September 17, 2012.



### 3.0 **BIOSPARGE TREATMENT SYSTEM INSTALLATION**

#### 3.1 **GENERAL**

The biosparge system was installed/constructed in accordance with the 100% Final Design Report except for the modifications described in the following sections of this report. All substantive modifications were approved by the EPA prior to their implementation.

Following EPA approval of the 100% Final Design Report, the groundwater remediation for the Site was implemented. Project implementation included the following tasks:

- i) Property access/easements were secured from property owners
- ii) The required construction/operating permits were obtained
- iii) The remedial system was constructed
- iv) The remedial system was started up and operated

Prior to initiating the construction of the groundwater remediation, easements and access agreements were negotiated with the affected property owners. The site layout drawing (Figure 1.2) shows the area occupied by the remediation system. As shown, there are several properties that were affected.

The biosparge system was installed in two phases. The first phase was the Pilot System which included the control building and the first four injection well nests. The control building and other components of the Pilot System (e.g., air compressor, air and water piping, controls, power and control conduits, and wiring, etc.) were installed and tested from November 2005 through September 2006.

The control center facility includes process equipment designed to inject air, water, and a carbon source (if needed), into the main VCM subplume in order to enhance VCM degradation. The control building is located on a parcel of property that is located west of South Oyster Bay Road and south of Hazel Street. The Northrop pumping well GP-6 was historically located on this parcel. This location was selected due to its proximity to the middle injection well fence line and its availability. The Pilot System became fully operational in October 2006.

The remainder of the biosparge system was installed in three stages:

1. The north fence underground components, excluding the injection and monitoring wells, were installed from September through December 2008
2. The injection and monitoring wells for the north fence and the remainder for the middle fence were installed from September 2010 through May 2011
3. The remaining biosparge system components (e.g., remainder of middle fence injection well vaults, power and control conduits and wiring, controls, air and liquid piping, etc.) were installed from March through August 2012

A chronology of the construction, operation, and monitoring of the Pilot System and construction of the remainder of the biosparge system is provided in Table 3.1.

Design drawings for the biosparge system and the control building are attached separately. The list of design drawings is provided in Appendix A.

### **3.2 SITE PREPARATORY ACTIVITIES**

The site preparatory activities for the Pilot System included:

- i) The purchase of the Hazel Street property for construction of the control building
- ii) Surveying the layout of the Pilot System including the control building
- iii) Clearance of underground utilities
- iv) Submittal of and approval by the Town of Oyster Bay for excavation and road crossing plans
- v) Submittal of and approval by property owner's upon whose property various components of the remedy were to be installed
- vi) Mobilization of an office trailer and sanitary facility
- vii) Installation of a temporary construction fence along Hazel Street and South Oyster Bay Road and around individual work areas as needed
- viii) Pre-construction health and safety meeting with contractor personnel
- ix) Construction of a decontamination pad for drilling equipment contacting potentially contaminated soil

No site preparatory activities were required for the installation of the north fence well vaults (located on property currently occupied by Sleep's) and connecting

piping/conduits, except for the layout of the vaults and piping and a pre-construction health and safety meeting with the contractor. The reason for this is that the contractor retained by Sleepy's for the property redevelopment construction activities was already on Site and performing other construction activities.

The site preparatory activities for the remainder of the biosparge system included:

- i) Submittal of and approval by property owner's upon whose property various components of the remedy were to be installed
- ii) Surveying the layout of the connection between the north and middle fence
- iii) Clearance of underground utilities
- iv) Mobilization of a secure box container to store equipment
- v) Installation of a temporary construction fence around individual work areas as needed
- vi) Pre-construction health and safety meeting with contractor personnel
- vii) Construction of a decontamination pad for drilling equipment contacting potentially contaminated soil

### **3.3 AIR INJECTION DURATION / FREQUENCY**

The air injection system is comprised of two injection well fences with eight and seven injection locations for the middle and northern fences, respectively (see Figure 3.1). Pursuant to the 100% Final Design Report, a minimum of six injection well nests at 100-foot centers were to be installed along each fence line. This objective has been met. Two air injection wells at different depths were installed at each injection location. The 100% Final Design air flow rate and injection frequency for each well was approximately 100 standard cubic feet per minute (scfm) for 8 hours twice per month following the initial oxygen saturation injection at each well which was expected to take on the order of 40 hours. Air injection during the time period when only the Pilot System was operational was performed weekly for 8 hours at 100 scfm at each well since the air compressor, which is sized for the entire biosparge system, had excess capacity available. This was done to ensure that the highly anaerobic conditions in the core of the VCM subplume were converted to aerobic conditions in as short a time period as practical. It is believed that the periodic stop/start of the injections results in better distribution of the injected air into the formation since a slightly different flow path will be created by each injection, thereby spreading the injection through more of the formation. Continuous injection is not needed since the groundwater only flows at a

rate of approximately 0.4 feet per day (ft/day) (12 feet/month) and sufficient air can be injected in a short time period to saturate the volume of water that surrounds each injection well. Air is pulse injected into each well on a rotating basis cycling between the deeper and shallower injection points.

Air injections in the Pilot System have continually been performed since October 2006 with only a few periods of non-injection (e.g., during periods of biosparge system performance monitoring, for various maintenance work, and during construction of the final system).

### **3.4      INJECTION WELL LAYOUT/SPACING**

The injection well layout consists of two injection well fences (north and middle). The injection well nests along each fence line are set at a distance of approximately 100 ft apart. Each injection well fence/individual well location injects the air into the concentrated VCM intervals in sufficient quantity to insure that the desired aerobic degradation conditions are created. By using this two fence layout, the treated water from the north injection fence will eventually migrate to the middle injection fence which will then allow the middle injection fence to cease operation. The intent will be to continue to operate the north fence of injection wells (or a portion thereof) until the two upgradient well nests (MW-92 and MW-93) and the monitoring wells within the north fence system approximately reach 40 µg/L of VCM. Similarly, the middle fence (or portion thereof) will continue to operate until the monitoring wells in the middle fence system approximately reach 40 µg/L. The exact time of appropriate compliance allowing shutdown of the north or middle fence (or portions thereof) will be recommended by GHSI to the EPA. EPA approval will be obtained prior to implementing any shutdown activity.

Once the injection systems have been turned off, the groundwater remedy will rely upon monitored natural attenuation to complete the degradation of VCM to the State drinking water standards or Federal MCLs.

The 100% Final Design fence lines were spaced approximately 700 feet apart (equivalent to approximately 5 to 7 years of groundwater travel time). Subsequent to EPA approval of the 100% Final Design Report and prior to installation of the north fence, the owner of the property on which the north fence was to be installed redeveloped the property in 2007/2008. The redevelopment necessitated the following actions:

- i)      Monitoring well nest MW-52 was abandoned

- ii) The alignment of the north fence was moved approximately 250 feet to the south to be outside of the new building footprint and so as not interfere with property use (see Figure 3.1 for the revised alignment)

### **3.5 WELL INSTALLATIONS**

#### **3.5.1 INJECTION WELL INSTALLATIONS** **(SEE DRAWINGS CI-02, MP-01, MP-05, AND MP-06)**

The wells for the Pilot System were installed between September 2005 and May 2006 and those for the remainder of the biosparge system were installed between September 2010 and May 2011.

The four injection well nests installed for the Pilot System are IW-16, IW-17, IW-18, and IW-19 (see Figure 3.1 for locations). The injection wells for the remainder of the system were installed in the following sequence to assist in determining the number of injection well nests in each fence:

- i) The wells in the center core of the VCM subplume were installed first at each fence line
- ii) Subsequent wells were installed out to the east and west edges of the VCM subplume until a VCM concentration of approximately 40 µg/L or less was detected

The installation of the injection well nests along the north fence reached its western terminal point at IW-1 where the VCM concentration in one interval was 70 µg/L. The VCM concentrations in all the other sampled intervals at this location were non-detect. It is anticipated that the lateral dispersion of the injected air and mixing as the groundwater migrates will result in the delivery of oxygen to the groundwater west of IW-1. The eastern terminal point was reached at injection well nest IW-7 where the maximum VCM concentration in one sampled interval was 44 µg/L and in the remaining sampled intervals was non-detect.

The installation of injection wells along the middle fence reached its western terminal point at IW-15 where the VCM concentrations were already less than 40 µg/L. Nonetheless, an additional borehole was drilled and sampled at a location approximately 100 ft farther to the west for further confirmation of attainment of low level VCM presence. Based on the VCM concentrations being less than 40 µg/L, a

monitoring well nest (MW-86) was installed at this location. On the eastern end of the middle fence, injection wells IW-20, IW-21, and IW-22 were installed. It is expected that IW-22 is the east limit of the middle fence injection wells because the VCM concentrations at this well were less than 40 µg/L.

The 6-inch diameter boreholes for the injection and monitoring wells were drilled using the rotary sonic method. A continuous soil core was collected and the entire core was screened for VOCs using a photoionization detector (PID). Geophysical logging of a select location (i.e., MW-92) was performed. The stratigraphic and geophysical logs are provided in Appendix B.

Groundwater samples were collected from approximately 50-foot intervals. The interval between collected groundwater samples was adjusted in some cases to take into consideration the results of the PID readings and the geology observed. Groundwater collection started at a depth of approximately 200 feet BGS for the north fence and approximately 300 feet BGS for the middle fence.

Groundwater samples were not collected from boreholes that were located within 25 feet of a borehole previously sampled (e.g., MW-83/VZ-10 which are located 20 feet downgradient of IW-16). Groundwater samples were only collected from the deepest borehole at each location that had multiple installations. The VCM concentrations detected in the groundwater samples collected during the drilling process are listed in Table 3.2. The VCM concentrations are presented on Figure 3.3 (north fence) and Figure 3.4 (middle fence).

The PID, groundwater, and geophysical results were reviewed to select the appropriate intervals for the installation of the well screens and to determine whether another well further out along that particular fence line was needed.

The depth of the boreholes drilled at each location was based on the measured depth to the bottom of the VCM subplume at each of the injection fences/wells location. Confirmation that the bottom of the VCM subplume had been reached was provided by the PID readings and the groundwater samples that were collected from or near the bottom of the borehole. This ensured that the borehole fully penetrated the VCM subplume and allowed the selection of the appropriate intervals in which to install the injection wells to ensure the complete thickness of the VCM subplume at each injection well nest location is being treated. The depth of the borehole typically extended approximately 50 feet below the measured bottom of the VCM subplume.

The injection points for the wells were strategically selected so that either gases or liquids can be injected into or just below the high concentration portion of the VCM subplume. The method of air injection relies on the pressure gradient created by the air injection to distribute oxygen vertically above the point of injection. It is most effective to inject air in between the fine-grained lenses that are present within the high VCM concentration subplume and also into the interval beneath the underlying fine-grained unit. Thus, two air injection points were used at each individual well that makes up the injection fence. The shallower air injection well screen was typically set at the base of the high permeability layer that contained elevated VCM concentrations. A second deeper air injection well, complete with its own screen, was installed approximately 20 feet below the base of the previously identified high permeability layer. This well screen was also set in a high permeability layer and is intended to provide upward cascading air through the entire overlying VCM impacted interval. Within the VCM subplume, the air is being injected into the bottom of the defined permeable interval (the permeable zone containing elevated VCM concentrations that is sandwiched between two low permeability layers). Injecting into the bottom of the permeable zone allows the air to rise and disperse as much as possible throughout the entire high concentration permeable interval. The reason for also injecting air below the fine-grained lenses that define the base of the high concentration VCM subplume is that such injection results in better areal distribution of the air. The air finds its own path around the lenses and bubbles up through the high concentration portion of the VCM subplume. Bubbling up of the air will occur as dictated by the slope of the underside of the discontinuous and randomly located clay lenses. Nonetheless, with the overlap of gaseous injections from neighboring injection wells along the fence, a continuous upward cascading curtain of gases has developed which spreads oxygen through the desired permeable unit.

To the extent possible, the air injection well screens were set at elevations above an identified underlying layer of PCE and TCE that was found beneath the VCM subplume originating from the Hooker/Ruco Site.

The vertical layout of the air injection and groundwater monitoring wells is shown on Figure 3.2 and the actual air injection well screen intervals are shown on Figures 3.3 and 3.4.

The Pilot System air injection well screens are 1-inch-diameter, 5-foot-long stainless steel and the riser pipes are 1-inch-diameter black steel.

In addition to the air injection well screens, each well nest was equipped with one liquid supplement injection well and screen. The setting for the 15-foot long screen (maximum) liquid supplement injection well was from just above the base of the high

permeability layer that has the highest VCM concentration. At this elevation, the base of the liquid supplement injection screen will be at approximately the same elevation as the top of the adjacent air injection screen. This will allow for maximum dispersion of the injected liquids by the air injections.

For liquids, it is more effective injecting directly into the high concentration VCM subplume. Mixing is assisted by the air injection process and also more significantly by the natural flow/dispersion forces that exist.

The Pilot System liquid injection well screens are 1-inch diameter, 10 to 15 feet long PVC, and the riser pipe is 1-inch diameter PVC. The Pilot System liquid injection wells were installed in the same sandpacked interval as the shallow air injection well.

Based on the results of the first year of performance monitoring of the Pilot System, the following changes were recommended in January 2008 for the remainder of the biosparge system injection wells:

- i) Increase the diameter of the water and air injection wells from 1 to 1.25 inch
- ii) Install the water injection well and shallow air injection well in separate sandpacked intervals
- iii) Install a steel plate on the bottom of the air injection wells to prevent settling of the wells
- iv) Install a spacer in the upper 0 to 20 feet of the injection well nests to maintain separation between the wells at the ground surface

The support for these recommendations was presented in the document entitled "Quarterly Report - Fourth Quarter 2007 (October through December) dated January 15, 2008. EPA acceptance of these recommendations was received on January 25, 2010. The wells for the remainder of the biosparge system were installed between September 2010 and May 2011 in accordance with these recommendations.

Well installation details are provided in Table 3.2 and well instrumentation logs are provided in Appendix B.



### 3.5.2 MONITORING WELLS

#### 3.5.2.1 GROUNDWATER MONITORING WELLS

The locations of the groundwater monitoring wells are shown on Drawing CI-02. The majority of the monitoring points are located at approximately the midpoint between every other pair of injection wells. The middle fence mid-point wells are installed at a distance of approximately 50 feet downgradient of the injection wells. The north fence mid-point wells were installed at a distance of approximately 30 feet downgradient of the injection wells. This shorter distance was required due to space limitations along the southern property line of the Sleepy's property.

As shown on the Drawing, this layout results in four and three mid-point monitoring locations for the middle and north injection fence lines, respectively. The midpoint location was selected as the primary monitoring location since this is the location farthest from the injection point, and therefore the area least exposed to the injected materials. Thus these locations should be typical of worst case conditions. The monitoring well nests typically consist of two wells for the groundwater and two wells for the vadose zone. The exceptions to this are well nests MW-61, MW-76, and MW-85 each of which has four groundwater monitoring wells. The screened intervals of the groundwater monitoring wells were typically set at:

- i) An elevation equal to the mid-point between the top and bottom of the VCM subplume
- ii) In the next overlying sand unit above the VCM subplume

Cross-sections of the north fence and middle fence groundwater monitoring wells are shown on Figures 3.3 and 3.4, respectively. The groundwater monitoring well screens are 10 feet in length. Typical groundwater monitoring well details are shown on Drawing MP-05.

Furthermore, to provide an early indication of the impact of the biosparging system, groundwater monitoring wells were also installed approximately:

- i) 5 feet downgradient of the injection fence at the midpoint between adjacent injection wells at one location for the north fence and two locations for the middle fence
- ii) 20 feet immediately downgradient of an injection well (2± months travel time) at three and two locations for the middle and north fence, respectively

Existing wells located in appropriate locations (i.e., MW-61I, MW-61D, and MW-61D2 for the middle fence and MW-90D1 and MW-90D2 for the north fence), were included in the monitoring well network in lieu of new installations.

### **3.5.2.2 VADOSE ZONE MONITORING WELLS**

Vadose zone wells were installed in the same locations as the groundwater monitoring wells installed at distances of 20, 30, and 50 feet downgradient of the injection fences.

Two vadose zone wells were installed at each location; one at a depth of approximately 8 feet BGS and one immediately above the groundwater table (approximately 50 feet BGS). The 8-foot depth was selected to be representative of a basement depth. The vadose zone wells were constructed of 1-inch diameter PVC pipe with screens 2 feet in length for the 8-foot deep wells and 5 feet in length for the wells just above the groundwater table. A longer well screen for the deeper vadose zone well was used to account for fluctuations in the groundwater table. The annulus of the borehole above the sandpack was sealed with a 2-foot bentonite pellet/chip seal overlain with cement grout containing 6 percent bentonite to prevent short-circuiting between wells and with the atmosphere. Typical vadose zone monitoring well details are shown on the Drawing MP-05.

### **3.6 FORCEMAINS (SEE DRAWINGS MP-01 THROUGH MP-08)**

The injection well forcemains consist of two completely separate piping systems, one for the air supply and one for the water/liquid supply. The air portions of the forcemain system are wrapped (for corrosion resistance) Schedule 80 carbon steel pipe. High density polyethylene (HDPE) pipe (SDR11) was used for all direct buried underground forcemains that are used to distribute water, and potentially, liquid supplements throughout the system.

The forcemain piping layout is presented on the "As-Recorded" Drawings, a list of which is provided in Appendix A. Sizing of the liquid forcemain piping is based on maintaining a fluid velocity between 3 and 5 feet per second (based on 25 gpm) while at the same time maintaining a certain diameter pipe to allow easy cleaning during maintenance, if needed. Airline sizing is based on maintaining a minimum pressure drop in the pipe in order to minimize the size of the compressor.

The maximum internal pressure at any point in the air forcemain piping system is not to exceed 200 pounds per square inch gauge (psig).

### **3.7 AIR/LIQUID DISTRIBUTING SYSTEMS (SEE DRAWINGS MP-01 THROUGH MP-08)**

#### **3.7.1 GENERAL**

The primary components of the biodegradation remedy are the air distribution system and the liquid delivery system. The air distribution system feeding the injection wells consists of the following sub-systems:

- i) Air compressors
- ii) Air distribution forcemains
- iii) Control and power cables to the well points

The liquid distribution system consists of the following sub-systems:

- i) Liquid supplement mixing unit
- ii) Liquid amendment distribution forcemains
- iii) Control and power cables to the well points

For the air distribution system, the air is supplied by electric driven air compressors. The air compressors are housed in the control building. The control building also houses a liquid supplement mixing unit, a workstation for the operator, a washroom, and an equipment cleaning station. The structure is a prefabricated, insulated, and weathertight modular building, with approximately 1,000 square feet of space (e.g., 28 x 38 feet). The building was placed on a compacted gravel base for support and has one oversized door. The building is split into two main areas; one for the office and controls and one for the compressors and mixing unit. The office/control portion of the building has HVAC for heating and cooling while the equipment side only has heating and venting.

The air from the compressors is directly piped to each individual injection well head via a forcemain with appropriate valves at each individual well head. The main air supply forcemain consists of a 3-inch diameter steel pipe that is connected to each individual injection well via a 1 1/2-inch diameter steel pipe equipped with a motorized valve and flow meter. A supply forcemain constructed of 1 1/2-inch and 2-inch diameter HDPE

pipe was also installed to supply water and the liquid supplements, if needed. The main liquid supply forcemain is connected to each individual injection well via a 1 1/2-inch diameter steel pipe equipped with a motorized valve and flow meter. The air and liquid pipe networks are completely independent from each other.

The valves at each individual well head are activated from the control building. Control and power cables are linked from the control building to the well heads in separate 2- or 3-inch diameter conduits. Separate conduits were used so that the induced currents in the power cables do not create false signals in the control cables. The forcemains, conduits, and cables are of sufficient capacity to allow for the installation of injection wells at 50-foot spacings along each fence line, should the need for additional wells be necessary.

The airflow to the injection wells is controlled by a variable frequency drive (VFD) on the compressor and flow meter in the control building. The flow meter sends a signal to the controller which automatically controls the VFD to maintain a constant flow. If the flow falls below a set rate, an alarm will sound. Each injection well nest has two air injection points. Each point has an automatic control valve and flow meter to allow for fine tuning of the air flow, and a manual shutoff valve. The total flow from the control building can be directed down more than one well by opening one or more of the automatic valves. If more than one point is utilized at a time, the flow must be automatically adjusted at the wells to insure that each well is receiving the correct amount of air. The control system will continually adjust the air flow as needed due to the fact that slight differences in well screen elevations, as measured with respect to depth below the water table, can result in different pressures being required to depress the water table to the top of the well screen to allow the air to be injected into the groundwater formation. If the pressure differential between two wells is too large, the control system will ensure that the air will not preferentially be injected into the well that has the least height of water above it.

The liquid flow to the injection wells is controlled by a mixing unit, a control valve, and flow meter, which are also contained in the control building. The liquid supplement, if required, will be fed from the automatic mixing unit into the main water supply and then on to the wells. The flow meter will send a flow signal to the controller which will automatically control the valve to maintain a constant flow to the wells. If the flow falls below a set rate, an alarm will sound. Each well point has an automatic control valve, flow meter, and manual shutoff valve. The total flow from the control building can be directed down more than one well by opening one or more of the automatic valves. If more than one point is utilized at a time, the flow will be automatically adjusted at the

wells to compensate for pressure differences. Again, this will be necessary to insure that each open well is receiving the intended liquid supplement.

Water without supplements will be used to flush the pipeline after each liquid supplement injection to help prevent bio fouling of the supply lines, well screens, and the soils immediately adjacent to the well screen. The liquid supplements, which will be small in volume if used, will also be injected prior to air injection whenever possible so that the large volume of injected air will assist in the distribution of the liquid supplement in the groundwater formation.

EPA approval was received on August 4, 2006 to use treated groundwater from Northrop's GP-1/GP-3 treatment system as the water for the liquid supply system. The New York State Public Service Commission approved the supply of this treated water from Northrop to GSHI on November 13, 2006. A copy of this approval is included in Appendix C. This treated water is used as an additional supply of oxygen to the aquifer and to flush the liquid pipeline when supplements are injected. The advantages of using this groundwater are as follows:

- i) The treated water has a high dissolved oxygen content due to having been run through the Northrop treatment facility air stripper
- ii) The treated water has to be reinjected into the groundwater formation anyway under the rules and regulations of the local water district administration (at the present time it is reinjected at the ground surface)
- iii) The treated water is not chlorinated

Injection of the treated water to supplement the delivery of DO to the VCM-injected groundwater began on January 22, 2007. Injection has been continuous at a rate of up to 15 US gpm. The volume of treated water injected per month is provided in Table 3.4. As of August 31, 2012, 10,585,000 gallons have been injected. To date, the water that has been injected only includes oxygen since there has not been a need to provide supplements. In the future, if liquid supplements need to be injected and if the treated water is not available, city water will be used to prepare the liquid supplements.

As previously described, the control instruments for each well consist of a local flowmeter, pressure indicators, and an automatic valve. The operating status of the valve is displayed in the control room (e.g., open, closed or percent open). Also, each flow meter is equipped with a flow alarm to indicate if the well is not accepting flow. Injection pressures will be maintained below the formation rupture pressure.

Furthermore, to reduce potential silting of the well, air injections are applied and relaxed gradually over several minutes.

The main panel in the control building contains a Programmable Logic Controller (PLC) manufactured by Allen-Bradley to control the operation of the system. The PLC allows interfacing with an operator from a personal computer (PC) running a Human Machine Interface (HMI) software package by Genesis. An HMI is a graphical operator interface package that operates, in this case, under a Windows software operating system.

The controls for the Pilot System were upgraded in October 2008 to include an electric relay to protect the PLCs. The relays also allow the air and water injection cycles to operate automatically, eliminating unnecessary shutdowns.

The system runs in an automated mode and does not require an on-site operator. Operator presence at the facility was required during the initial set up, and will be required to respond to major alarms of the system, and for maintenance.

The operator initiates the injections from the PC, and the injection sequence continues until stopped from the PC by the operator or the controls measure an alarm condition (e.g., pressure too high) which will shut the system off. The sequence can also be programmed to start over once it has been completed. The PC also allows the operator to be able to change the timing of the air sparging and liquid injection sequences. The PC displays injection header pressure, flow rates, temperature, injection sequence status, and alarms. It is connected to a phone line to allow for remote access of the control system. The injection times and well sequencing can all be controlled and programmed at the HMI for complete automation and flexibility.

A security system was installed at the control center which is monitored 24 hours a day. The system monitors the power to the control room, fire/smoke detectors, entry detection sensors, and process alarms. In the event of an alarm or indication of a failure of the security system (security breach), the monitoring company contacts the appropriate personnel to take action.

### **3.7.2      COMPRESSORS**

The main compressor is an Atlas-Copco Model No. GA-75VSD with VFD positive displacement screw drive capable of delivering 337 scfm at a pressure of 175 pounds per square inch (psi). The auxiliary compressor is an Ingersoll-Rand Model UP6-30 capable of delivering 100 scfm at a pressure of 175 psi. The auxiliary compressor was installed in

April 2010 to provide backup in the event that the Atlas-Copco Model is ever shut down for maintenance for an extended period.

The air is filtered by pre-filters and polishing filters to remove any water and oil that is carried over from the compressors prior to being injected into the ground. The air also passes through an air dryer to protect the instrumentation downstream of the compressor/dryer system.

### **3.7.3 SUPPLEMENT MIXING UNIT (MAKE-UP AND DELIVERY SYSTEM)**

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If needed, the mixing unit will be used to combine the liquid supplement (sugar byproducts) with water for transfer to the injection wells. The mixing unit includes a metering pump and mixing chamber. As of the date of this report, no liquid supplements have been needed or injected.

The supplement metering pump is capable of injecting concentrated sugar byproducts into the mixing chamber where it will mix with water prior to being injected into the ground. The mixing rate will be about 1 pound of sugar byproducts per 150 gallons of water (approximately 800 ppm). The supplement metering pump can pump up to 2 gallons per hour (gph) of concentrated sugar byproducts.

After mixing in the mixing chamber, the sugar byproducts solution will be injected into the forcemain (with additional feed water using the treated/aerated water from Northrop's GP-1/GP-3 treatment system) that feeds the wells to maintain a concentration in the groundwater of up to 25 mg/L (e.g., 5 gpm for 20 minutes each day). This feed rate will be revised as appropriate based on the performance monitoring results. The supplement injection pump has a capacity of 2 gph and can deliver the liquid supplement to 3 wells at a time, if so desired.

Mixing the supplements with a larger water volume and pumping at a higher rate substantially improves the mixing zone and assists in keeping the injected supplements at much lower concentrations. This, in conjunction with the fact that the treated water has elevated DO concentrations, reduces the chance for the creation of an anaerobic zone in close proximity to the liquid injection well.

### **3.8        INSTRUMENTATION AND CONTROL LOGIC** **(SEE DRAWINGS E-01 TO E-16)**

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#### **3.8.1        GENERAL**

The injection system's control logic is designed to allow the system to operate without supervision in a fail-safe mode. All control signals are fed to one PLC. The PLC supplies the appropriate responses to the signals using a PLC programming language. The PLC is located in the main control room in the control building. An operator can monitor and control the treatment system through the HMI. All process equipment can be shut down locally at the Site or remotely through the HMI. An emergency shutdown button is located at the HMI, which will shut down the entire injection system.

#### **3.8.2        INJECTION WELLS**

All inputs and outputs associated with the individual wells are routed to the PLC.

Each injection well has pressure indicators, flow meters, and control valves for the air injection and the liquid supplement addition. The flows and valve position are transmitted to the PLC for indication and alarming. These alarms and the valve positions are then displayed on the HMI computer screen.

#### **3.8.3        SUPPLEMENT MIXING UNIT (MAKE-UP AND DELIVERY SYSTEM)**

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Supplements are pumped into the mixing unit and water is diverted into this unit to form a solution to be injected into the forcemain and from there into the injection wells.

A flow transmitter measures instantaneous combined flow from the mixing unit and water source to the injection wells. The instantaneous flow rate is displayed locally on the flow meter. The instantaneous flow rate is transmitted to the PLC and displayed on the HMI computer screen. Total flows are displayed on the instrument only.

The dosing rate of sugar byproducts is sent from the HMI to the mixing unit. The metering pump adds the correct amount of sugar byproduct to the mixing unit based on the required dosing rate and flow to the wells.

Following the mixing of the supplement in the mixing unit, the mixture is injected into the forcemain and mixed with the water source.



After the injection of the sugar byproducts into the water source, the mixture flows through an automatic flow control valve. This valve is operated by a Proportional/Integral/Derivative loop (PID loop) in the PLC based on the flow of the combined stream of water and sugar byproduct solution. As the flow rate deviates from a specified flow set-point, the PLC automatically adjusts an analog control signal to open/close the valve in order to compensate for the difference in flow. As the flow rate returns to the set-point, the PLC decreases the rate at which the analog control signal changes and attempts to maintain the valve's position. Overall, the PID loop adjusts the valve's position to maintain a constant flow to the injection wells.

Prior to water injection, any buildup of air/water pressure in the liquid injection wells is released into the storage tank located in the control building. Some groundwater is transmitted to the storage tank during the pressure release. The pressure release is required since the pressure of the water supplied by Northrop is sometimes lower than the pressure in the liquid injection wells. The pressure release decreases the pressure in the well system to allow the water supplied by Northrop to flow into the liquid injection wells.

Flow to the wells is measured by a flow transmitter which displays instantaneous flow locally. The flow rate is transmitted to the PLC and also displayed on the HMI computer screen.

Additional flow control at each individual well is maintained using the same philosophy as above, for the supplement mixing unit.

#### **3.8.4      AIR DELIVERY SYSTEM**

Air (the source of oxygen) from the compressor flows from the control building to the injection wells.

A flow transmitter measures instantaneous flow and temperature of the air leaving the compressor as it is injected into the injection wells. The instantaneous flow rate and temperature are displayed locally on the flow meter. The instantaneous flow rate and temperature are transmitted to the PLC and displayed on the HMI computer screen. Total flows are displayed on the instrument only. Only one of the two compressors operates at any given time.

The main compressor speed is controlled by a VFD. This VFD is operated by a PID loop in the PLC based on flow from the compressor. As the flow rate deviates from a specified flow set-point, the PLC automatically adjusts an analog control signal to "ramp up" or "ramp down" the speed of the compressor in order to compensate for the difference in flow. As the flow rate returns to the set-point, the PLC decreases the rate at which the analog control signal changes and attempts to maintain the compressor's speed. Overall, the PID loop adjusts the compressor's speed to maintain a constant air flow to the injection wells.

At the discharge of the compressor, the air flows through an automatic flow control valve. This valve is an open/closed valve used for system isolation during a shutdown condition. This valve is operated by signal in the PLC based on a permissive from the PLC. As the flow, temperature, or pressure deviates from specified set-points, the PLC automatically shuts down the compressor and closes the valve. The operator will be required to determine the problem prior to restarting the system.

Additional flow control at each individual well is maintained using the flowmeter and the control valve at the well. A PID loop controls the flow valve as described above.

### **3.8.5      ELECTRICAL (SEE DRAWINGS E-01 TO E-16)**

#### **3.8.5.1    GENERAL**

The electrical design provides for the project electrical loads and conforms to the latest requirements of ANSI/NFPA 70 "National Electrical Code" and ANSI/IEEE C2 "National Electrical Safety Code".

The electrical drawings are included in Appendix A.

#### **3.8.5.2    SAFETY CONSIDERATIONS**

All electrical equipment and systems are designed and constructed to meet the following minimum safety requirements:

- i)      Electrical equipment and material have adequate current carrying capacity, short circuit, and Basic Impulse Insulation Level (BIL) interrupting and/or withstand ratings
- ii)     Equipment and device enclosures are of a dead front type

- iii) Non-current carrying electrical equipment exposed metallic parts (such as enclosures, raceways, etc.) are grounded
- iv) Equipment and device enclosures are properly identified and, where required, are supplied with the rating nameplates
- v) Sufficient access to and working space around all electrical installations will be maintained to provide for ready and safe operation, and to allow for equipment maintenance
- vi) Electrical classification of all work areas is non-hazardous

### **3.8.5.3     PROJECT LOADS**

The project electrical loads consist of the process equipment motors, heat tracing, HVAC, lighting, process instrumentation, controls, communication equipment, and other similar items.

The project loads require 480-volt (V), 277-V, 208-V, and 120-V, 60 hertz (Hz) power supplies. The power originates in the control building and is distributed to the well vaults as needed.

### **3.8.5.4     POWER SERVICE**

The designated power service is located in the control building. It is provided by the local power provider operating in the project area.

The power service is a 480 VAC, 3-phase, 4-wire solidly grounded system. It is sized to the project power load requirements and it does provide for the anticipated power load growth.

The service entrance arrangement is in accordance with the power service provider specifications.

### **3.8.5.5     POWER DISTRIBUTION AND CONTROL EQUIPMENT**

The project power distribution and control equipment consist of a 480-V service panel, 480-V-208/120-V step-down transformers, 208/120-V distribution panel boards, low

voltage motor controllers, and safety switches. All power equipment and control is located in the areas designated on the Drawings.

#### **3.8.5.6     LIGHTING**

The lighting provides adequate illumination in the operation areas, and will supply the required illumination in emergency situations. Lighting is provided as follows:

- i) Project lighting includes the outdoor and indoor lighting systems
- ii) The outdoor lighting at the control building consists of high intensity discharge (HID) lights which are photo-electrically controlled with manual over-ride
- iii) The indoor lighting consists of a mixture of HID and fluorescent lights, self-contained individual emergency lighting units, and exit signs as follows:
  - a) The HID and fluorescent lights are manually controlled
  - b) The emergency lighting units are strategically located to illuminate passages to the exit doors and illuminate automatically in the case of indoor general lighting failure
  - c) The exit signs are battery supported and are placed in strategic locations to direct occupants to the doors

#### **3.8.5.7     CONVENIENCE OUTLETS**

120V AC convenience outlets are furnished at accessible locations in operational areas of the facility to provide power for portable lighting and small tools.

#### **3.8.5.8     WIRING**

Wiring is provided to interconnect all project electrical, instrumentation, communication equipment, and loads.

The project wiring falls into one of the following three categories:

- i) Low voltage power and control wire and cable for the project power and control equipment and loads

- ii) Instrumentation cable for the project instruments
- iii) Data communication cable for the project data communication network

The project wiring is carried in cable trays and conduits and meets all specified application and environmental conditions.

#### **3.8.5.9 GROUNDING**

Grounding to provide for the electrical system grounding requirements, lightning protection system, and personnel safety consists of ground rods and interconnecting grounding cable. The grounding is designed to obtain a maximum of 5 ohms resistance to ground.

#### **3.8.5.10 OVER-VOLTAGE PROTECTION**

Over-voltage protection is provided against voltage surges induced by lightning, equipment switching, and other sources of voltage transients. All project power equipment has the proper BIL ratings, and transient voltage surge suppression devices are provided.

### **3.9 CONTROL BUILDING (SEE DRAWING CI-02 THROUGH CI-04 AND ST-01 THROUGH ST-07)**

The control building is a 1,064-square-foot one-story pre-engineered structural steel building designed in accordance with the Building Code of New York State. The building is designed as Facility-Industrial with Occupancy Code of Use Group F-2. The building construction material classification is non-combustible Type 2B.

The control building consists of the main service area and a control room/lavatory. The building is 28 feet by 38 feet with an eave height of 14 feet 6 inches above its floor level. The control room area is 13 feet by 26 feet 8 inches, and located in the eastern part of the control building. The building roof is at a 2:12 slope directing precipitation/rainwater from the roof to the ground surface adjacent to the building. The ground around the building is graded to direct rainwater away from the building.

The building is a rigid framed steel structure with a single clear span, straight (non-tapered) columns and gabled roof beams. The building roof and walls have

insulated pre-finished metal panels. Pre-finished interior liner panels of limited height are installed along the building perimeter walls. The interior wall between the control room and treatment area is 4-inch insulated gypsum board.

Access to the service area of the building is provided through a 6-foot by 7-foot double door. The control room is accessed using a 3-foot by 7-foot man door from the service area.

The control room includes a motor control center and a lavatory. The electrical equipment and instrumentation are wall or floor mounted as shown on the Drawings. The lavatory is intended for occasional use.

The mechanical piping in the service area is supported using steel pipe supports mounted on the building floor. Electrical conduits are wall or building ceiling supported. The process equipment is supported by a reinforced concrete floor slab.

The building floor is a reinforced concrete slab-on-grade. The building foundations are continuous reinforced concrete wall footings.

The heating system for the control building maintains an inside temperature of 55 degrees Fahrenheit (°F) based on an ambient outside temperature of 11°F. One electric unit heater with diffusers to distribute heat is located in the building for this purpose. One combined louver/shutter and one panel fan are furnished for ventilation. The ventilation system provides a minimum of one air change per hour, or an induced ventilation exhaust of at least 1 cfm per square foot of floor space. The control room is equipped with a through-the-wall air conditioner/heater unit. An exhaust fan is installed in the lavatory.

The building is categorized as light (low) fire hazard and is equipped with portable fire extinguishers (Class ABC) to provide fire protection.

### **3.10 UTILITIES (SEE DRAWINGS CI-02 THROUGH CI-06 AND MP-01 THROUGH MP-14)**

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#### **3.10.1 GENERAL**

The utilities include potable water, sanitary, electrical power, and phone service.

### **3.10.2      POTABLE WATER**

Potable water supply is required for the hose stations and the lavatory and is required as a back-up supply for the liquid injection system should the treated groundwater from Northrop's GP-1/GP-3 system not be available. The source of potable water supply is the water main located on the north side of Hazel Street. A pressure of 30 to 70 psi is available at the water main. A new 2-inch diameter water service line was installed, extending from the water main to the control building.

### **3.10.3      SANITARY**

The municipal sanitary sewer on Hazel Street was tapped into to provide sanitary sewer discharge for the control building.

### **3.10.4      ELECTRICAL**

The power service required for the biosparge is described in Section 3.8.5.4.

### **3.10.5      PHONE SERVICE**

The control building is provided with two voice grade phone lines. One line is connected to the building telephone and control panel Autodialer. In the event one of the monitored points on the Autodialer goes into alarm, it will capture the phone line and make the appropriate emergency call outs. The second line is connected through a modem to the control PLC so that calls can be made into the control center for troubleshooting purposes.

## **3.11          WATER AND EXCESS SOIL HANDLING**

Water generated by well installation, development, and purging, and equipment decontamination activities was discharged to the Cedar Creek Water Pollution Control Plant (WPCP) in accordance with the approvals received from the Nassau County Department of Public Works.

Excess drill cuttings for the Pilot System wells and sediment from well development and equipment decontamination activities were disposed of at the BFI Conestoga Landfill

located in Morganstown, Pennsylvania. The excess drill cuttings and sediment for the remainder of the Biosparge System were disposed at the GROWS Landfill located in Morrisville, Pennsylvania.

Excess soil excavated during excavation of the control building and Pilot System injection well vaults and conduit/forcemain trenches between these injection well vaults were transported to the Hooker/Ruco Site and used by Bayer as backfill.

Excess soil excavated during excavation of the north fence well vaults and conduit/forcemain trenches between these injection well vaults were left on the Steel Equities/Sleepy's property prior to construction of the parking lot.

Excess soil excavated during construction of the vaults for middle fence injection wells IW-20, IW-21, and IW-22 and the conduit/forcemain trenches between these injection well vaults were left on the Northrop Property. Excess soil from IW-15 and the trenches to connect the north and middle fences were placed on the Bayer property.

### **3.12        PERMITS/NOTIFICATIONS**

#### **3.12.1     BUILDING PERMITS/CERTIFICATES**

Permits obtained from the Town of Oyster Bay for the construction of the control building were as follows:

- i)        Area Variance;
- ii)       Construction Permit:
  - a)       Electrical Sub-Code
  - b)       Plumbing Sub-Code
  - c)       Fire Protection Sub-Code
  - d)       Building Sub-Code

Prior to the use of the biosparge system and occupying the control building, the following certificates were obtained:

- i)        Electrical Approval Certificate
- ii)       Certificate of Approval of Plumbing
- iii)      Certificate of Occupancy



Copies of these certificates are included in Appendix C.

### **3.12.2      INJECTION PERMITS AND OPERATING PERMITS**

At the present time, there are no known permits required for the air injection system.

The liquid amendment injection wells are Class V injection wells. As such, they are "permitted by rule" wells and no permit is needed. The applicable regulatory requirements for Class V wells pursuant to §144.27 include the submission of the installed well details and the periodic submission of monitoring (e.g., groundwater and soil gas) and injection fluid analysis results. The installed well details are included in Appendix B. Groundwater quality data are periodically submitted by GSHI to the EPA and DEC. Injected water quality data are periodically submitted by Northrop to the DEC.

Groundwater collected in the storage tank from the injection wells during pressure releases is periodically discharged to the Cedar Creek WPCP in accordance with the approvals received from the Nassau County Department of Public Works.

### **3.12.3      NOTIFICATIONS**

Notice was provided via the First Quarterly Progress Report - Third Quarter 2006 (August and September) dated October 4, 2006 to the EPA, DEC, and Nassau County the first time injection occurred for the Pilot System. The startup and first injection for the remainder of the biosparge system occurred in September 2012.

#### 4.0 CHRONOLOGY OF EVENTS

In summary, the primary activities performed since signing of the ROD, are listed below:

<i>Date</i>	<i>Activities</i>
Sept. 29, 2001	OU-3 ROD finalized by EPA
Apr. 26, 2001	Administrative Order issued
Feb. 8, 2002	OU-3 Pre-Design Activities Scope of Work approved by EPA
Feb. to Nov. 2002	OU-3 Pre-Design Activities performed
Apr. to Sept. 2002	Supplemental Treatment System for Northrop GP-1/GP-3 Treatment System constructed
Nov. 22, 2002	Off-site Groundwater Pre-Design Information Report (PDIR) submitted to EPA
Mar. to July 2003	Responses to EPA comments on PDIR submitted
July 29, 2003	EPA approves PDIR and designates the PDIR as the 30% Design Report
Sept. 2003	Lag bed of Supplemental Treatment System converted to potassium permanganate to treat VCM more efficiently
Oct. 31, 2003	Pre-final (95%) Remedial Design Report Submitted to EPA
Apr. 2004 to May 2005	Responses to EPA comments on 95% Design Report submitted
May 27, 2005	Final 100% Design Report submitted to EPA
July 7, 2005	Final 100% Design Report approved by EPA
Aug. 2005 to May 2006	Biosparge Pilot System wells installed
Nov. 2005 to Oct. 2006	Biosparge Pilot System Control Building and underground components installed and tested (start up)
Sept. 14, 2006	Pilot System Pre-Final Inspection performed
Oct. 27, 2006	Pilot System Final Inspection performed Pilot System starts full-time operation
Feb. 1, 2007	Pilot System As-Built drawings, well stratigraphy and instrumentation logs, draft O & M Manual, and HASP submitted to EPA
Jan. 16, 2008	Recommended modifications to the Biosparge System design and operation submitted to EPA
Sept. to Dec. 2008	The underground components (excluding wells) for the Biosparge System north fence installed
Aug. 27, 2009	EPA comments on the Biosparge System progress reports, the draft

<i>Date</i>	<i>Activities</i>
	O & M Manual and the HASP received
Sept. 23, 2009	Responses submitted to EPA on the August comments
Nov. 30, 2009	Information supporting effectiveness of the Biosparge System submitted to EPA
Jan. 25, 2010	EPA agreed that biodegradation of VCM was occurring and requested north and remainder of the middle fence construction be started in 2010
Sept. 2010 to May 2011	Remainder of Biosparge System Wells installed.
Sept. 22, 2011	EPA concurrence received allowing use of PDB/Hydrosleeve samplers for future groundwater sampling events
Oct. 24, 2011	Updated QAPP submitted to EPA
Dec. 2011 to Apr. 2012	Responses submitted to EPA comments on the updated QAPP
Apr. 13, 2012	Revised QAPP submitted to EPA
Feb. to Aug. 2012	Remainder of Biosparge System installed and tested
July 27, 2012	Biosparge System Pre-Final Inspection performed
Aug. 9, 2012	Draft Remedial Action Report submitted to EPA
Sept. 12, 2012	Biosparge System Final Inspection performed
Sept. 17, 2012	Biosparge System began full-time operation

An expanded list of activities is provided in Table 3.1

As noted in Section 2.2, it is estimated that the cleanup goals are projected to be met in approximately 12 years after the start of full-time operation of the entire biosparge system.

## **5.0      PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL**

### **5.1              PERFORMANCE MONITORING**

As previously stated in Section 2.2, the parameters to evaluate the performance of the biosparge system are:

- Dissolved Oxygen (DO): desired groundwater concentration of >2 milligrams per liter (mg/L)
- Total Organic Carbon (TOC): desired groundwater concentration of  $5 \leq \text{TOC} \leq 10$  mg/L
- VCM: decreasing concentrations

Of the above three parameters, the VCM concentration is the critical parameter. If the VCM concentrations are decreasing and are consistent with meeting the remedial objectives, the need to achieve the desired concentrations for DO and TOC is not imperative.

Performance monitoring of the Pilot System has been performed since October 2006. The results and QA/QC reviews of the results have been submitted to the EPA with the progress reports as the data was validated. The DO, total VOC (TVOC) and VCM concentration trends for the individual Pilot System groundwater monitoring wells are shown in Figure 5.1 through 5.7. The results show that the biosparge technology is achieving the remedial objectives in the area of the Pilot System.

### **5.2              CONSTRUCTION QUALITY ASSURANCE**

Construction of the biosparge system was performed in compliance with the quality assurance program described in the Construction Quality Assurance Plan (CQAP) provided in Appendix E of the 100% Final Design Report. The program included:

- i) Project meetings
  - Pre-Construction Meetings
  - Daily Tailgate Meetings
  - Weekly update meetings
  - Pre-Final Inspection

- Final Inspection
- ii) Inspection and testing activities
  - Daily inspections
  - Pressure testing of forcemains
  - Continuity testing of electrical circuits
- iii) CQA documentation
  - CQA instrument calibration
  - Inspection results
  - Testing results
  - Problem/corrective actions

All CQA documents are being retained by CRA in accordance with the Administrative Order.

No substantial problems or deviations of the program occurred during construction.

### **5.3        ANALYTICAL DATA QUALITY**

The performance monitoring analytical results and the QA/QC reviews of the results have been submitted with the appropriate progress reports upon validation of the data. In general, the data have been acceptable with minor qualifications as described within each QA/QC review report.

Sample collection and analyses prior to the November 2010 performance monitoring event were in accordance with the procedures presented in the OU-3 QAPP (100% Final Design Report, Appendix G). As a pilot test, Passive Diffusion Bags (PDBs) were placed in four of the 15 biosparge performance monitoring wells for the semi-annual sampling event that was performed for the second half of 2010. The PDBs were installed on November 15, 2010. Low Flow Purging (LFP) techniques were used to collect the samples from the remaining 11 wells in the monitoring program. These samples were collected between November 15 and 24, 2010. In accordance with the sampling protocols provided in the QAPP Addendum approved on October 26, 2010, the PDB samples were removed from the wells on November 29. Only one of the PDBs was successfully removed (and submitted for analysis). The remaining three PDBs were locked into the well and had to be removed with the driller's assistance. In response to the locked-in samplers, the QAPP Addendum was revised and approved by the EPA on

March 22, 2011 for the collection of samples from the same four wells using smaller diameter PDB and HydraSleeve™ samplers. Groundwater samples for the April 2011 performance monitoring event were collected using LFP methods from all 15 Pilot System monitoring wells and by PDB/HydraSleeve™ sample for four wells. An evaluation comparing the results of LFP sample results to PDB/HydraSleeve™ sampler results was submitted to the EPA on August 31, 2011. The data showed good correlation between the two sampling methods. This submittal also requested the use of PDB/HydraSleeve™ samplers be approved for future groundwater sampling events. EPA approval of the request was received on September 22, 2011. Groundwater sample collection for the November 2011 and April 2012 performance monitoring events were performed and subsequent events will be performed using PDB and HydraSleeve™ samplers in accordance with the procedures in the updated QAPP submitted on October 24, 2011 (revised April 13, 2012).

#### **5.4        NOISE SURVEY**

A noise survey was performed on January 8, 2007 within the control building to determine if sound protection for people working within the building was needed. The highest noise reading was 77.4 dB which occurred in the bathroom with the air vent fan running and the toilet flushing (a common household occurrence). Thus, no hearing protection or signage regarding high noise levels are needed.

## **6.0 BIOSPARGE SYSTEM INSPECTIONS AND CERTIFICATIONS**

### **6.1 PILOT SYSTEM**

#### **6.1.1 PRE-FINAL INSPECTION**

CRA and Camp, Dresser & McKee (CDM) personnel performed the Pre-Final Inspection for the Pilot System at the Site on September 14, 2006. CDM was contracted by the EPA to provide oversight of the remedial activities at the Site. One minor item (i.e., the amendment pump) was not operational during the Pre-Final Inspection as an electrician was working on the circuitry. During the inspection:

- i) All of the process equipment and piping was hydrostatically tested
- ii) All of the instrument and electrical loops were checked
- iii) All instruments were calibrated
- iv) The communication between the systems and PLCs was verified

#### **6.1.2 FINAL INSPECTION**

CRA and CDM personnel completed a Final Inspection of the Pilot System at the Site on October 27, 2006.

The Final Inspection included:

- i) An inspection of the biosparge system
- ii) A tour of the Site building and the injection vaults
- iii) Instruction on the operation of the system
- iv) A comprehensive review of the various HMI menus and injection sequences
- v) The air compressor was started and allowed to operate

The water injection was not initiated during the Final Inspection because approval for the use of treated water from the Northrop Grumman GP-1/GP-3 treatment system had not yet been received from the Public Service Commission. The water injections were subsequently approved by the Public Service Commission and have been occurring since January 22, 2007.

The air injection system was operating at that time. It was agreed that the Pilot System passed the Final Inspection and was ready for operation.

## **6.2        REMAINDER OF BIOSPARGE SYSTEM**

CRA, GSHI, and EPA personnel performed the Inspections for the final biosparge treatment system.

### **6.2.1        PRE-FINAL INSPECTION**

The Pre-Final Inspection was performed on July 27, 2012. The Pre-Final Inspection included:

- i)        An inspection of the biosparge system
- ii)       A tour of the control building and the injection vaults

At the time of the inspection, all construction activities were complete except for minor electrical work needed in two of the vaults. The main compressor was in the process of being repaired. CRA personnel were testing the control systems and the mechanical components of the system.

### **6.2.3        FINAL INSPECTION**

The Final Inspection was held on September 12, 2012. The Final Inspection included:

- i)        Instruction on the operation of the system
- ii)       A review of the various HMI menus, injection sequences, and alarms
- iii)      The air compressor was operating during the inspection

The entire system is now operational and full-time operation started on September 17, 2012.



### 6.3 HEALTH AND SAFETY

Construction of the biosparge system was performed in compliance with the procedures described in the HASP provided in Appendix F in the 100% Final Design Report. Operation of the Pilot System was performed in compliance with the procedures described in the HASP provided as Appendix L in the Draft Operation, Maintenance, and Monitoring (O,M & M) Manual submitted February 1, 2007. No substantive problems or derivation from the procedures occurred.

Operation of the entire biosparge system after August 2012 is being performed in accordance with Appendix L of the updated O,M & M Manual.

### 6.4 CERTIFICATION STATEMENT

To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Roger Smith

Senior Project Manager

\_\_\_\_\_  
NAME

\_\_\_\_\_  
TITLE



September 26, 2012

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
DATE

## **7.0      OPERATION AND MAINTENANCE ACTIVITIES**

### **7.1      LICENSING REQUIREMENTS**

There are no known licenses or permits required to operate the biosparge treatment system. Approval to discharge waters to the Cedar Creek WPCP was received as needed. The most recent approval was received on March 11, 2010 for a 3-year time period.

### **7.2      OPERATION, MAINTENANCE AND MONITORING**

A draft O,M & M Manual for the Pilot System was submitted on January 31, 2007. The updated final O,M & M Manual for the entire biosparge system was submitted in September 2012. The O,M & M Manual includes an updated HASP which covers the O,M & M activities.

The O,M & M Manual addresses the long-term operation, maintenance, and monitoring of the biosparge system. The O,M & M Manual provides a summary of the requirements for the various components of the system.

A summary of the basis of the O,M & M Manual is provided in the following paragraphs.

Operator presence is required on a periodic basis when the system is in full-scale operation. The system is designed to operate unsupervised, with the PLC monitoring key parameters for proper operation. Should an operating parameter be out of range, the system will attempt to adjust for it or if necessary shut down the process safely, while notifying the operator of the shutdown. The system cannot be started up remotely following a major alarm. The operator will have to go to the facility, evaluate the problem, and make corrections, prior to restarting the system. The operator will receive a summary of system operations from the PC HMI hooked up to the PLC. Information related to instrumentation readouts (i.e., process equipment and piping) and any alarms will be provided on the HMI. The operator will check the system's operation, log data, and sample as necessary. The PLC is designed to assist in the accumulation, storage, and trending of operating data. The operator is also responsible for the maintenance of the building and equipment.

### **7.3        HEALTH AND SAFETY**

The health and safety procedures for the operation and maintenance of the system are in accordance with those presented in the HASP included as an appendix in the O,M & M Manual for the entire biosparge system.

### **7.4        PERFORMANCE MONITORING**

Performance monitoring includes groundwater and vadose zone monitoring and process monitoring. Additional details regarding the scope of the monitoring is provided in the following sections. A summary of performance monitoring is shown in Table 7.1. All Pilot System monitoring and analytical results and QA/QC reviews have been provided to the EPA in prior submittals and these are not included in this report. The frequencies of sampling described below are applicable to each fence section.

#### **7.4.1      GROUNDWATER MONITORING**

The groundwater monitoring well network consists of three groups of well nests:

- i)      Middle Fence: four well nests located approximately 50 feet downgradient of the mid-point between adjacent injection well nests  
         North Fence: three well nests located approximately 30 feet downgradient of the mid-point between adjacent injection well nests
- ii)     Well nests located approximately 5 feet downgradient at the mid-point between adjacent injection well nests (one for the north fence and two for the middle fence)
- iii)    Wells nests located approximately 20 feet immediately downgradient of an injection well nest (two for the north fence and three for the middle fence)

The distance of 50 feet for the middle fence mid-point wells is equivalent to approximately 4 months of groundwater travel time. Thus, these wells were monitored quarterly for the first year of operation and semi-annually thereafter. The distance of 30 feet for the north fence wells is equivalent to approximately 2 months of groundwater travel time. Thus the mid-point north fence wells and the new mid-point middle fence well (i.e., MW-89) will be monitored quarterly for the first year of operation and then semi-annually thereafter.

The Pilot System wells, located approximately 5 feet downgradient, were monitored monthly for the first quarter of operation to assess the oxygen distribution and evaluate the zone of bioparging influence. Thereafter, all the Pilot System groundwater monitoring wells located 5 and 20 feet downgradient were monitored quarterly for a period of 2 years after startup of operation and semi-annually thereafter. All groundwater monitoring wells for the remainder of the biosparge system will be monitored quarterly for the first year of operation and semi-annually thereafter.

Initially, the groundwater was monitored for VOCs (including TICs), TOC, N, P, and the natural attenuation parameters, DO, ORP, pH, temperature, conductivity, and ferrous iron ( $\text{Fe}^{+2}$ ). VOC TICs were analyzed and reported for the groundwater samples collected from the first sampling event of each new well installed and the next sampling event from any existing well. If TICs were present in a well, TICs were continued to be analyzed/reported for the subsequent samples from each well until they were no longer present. For wells in which no TICs were present, no additional analysis/reporting of TICs was performed. In addition, heterotrophic microorganisms were analyzed annually for the first 2 years for the Pilot System wells and will be similarly analyzed for the first 2 years for the remainder of the biosparge system groundwater monitoring wells.

Prior to the start of air injection at each section of the injection well fence, baseline monitoring was performed at the appropriate wells. The frequency of the baseline monitoring for the Pilot System was as follows for the general chemical analyses:

- 2 weeks prior to the initial air injection
- 3 days prior to the initial air injection
- 2 days prior to the initial air injection
- 1 day prior to the initial air injection

Each well was analyzed for VOCs and TICs on only one of these four baseline dates. Since the intensive Pilot System pre-start monitoring did not identify any significant differences in groundwater concentrations or conditions over the time period of the baseline sampling, baseline sampling for the remainder of the biosparge system was performed only once before the start of air injection. The parameters analyzed/monitored for the baseline events were the same as those described above.

#### **7.4.2      VADOSE ZONE MONITORING**

Vadose zone wells were installed in the same locations as the groundwater monitoring wells and were monitored at the same frequency as the groundwater monitoring wells.

Soil gas samples have been and will continue to be collected for laboratory analysis of VOCs and methane. The results for the Pilot System have been provided in the progress reports submitted to the EPA. The samples were and will be collected semi-annually for a period of 2 years at each portion of the biosparge system as that portion becomes operational. In addition, the air immediately above the ground surface at each injection well has and will continue to be periodically monitored using a PID to determine if short-circuiting up the well annulus is occurring. Short-circuiting will be evidenced by a PID reading >10 ppm above background. An ambient air sample will be collected at ground surface near the shallow vadose zone well which had the highest reading greater than 10 ppm above background, if such reading occurs. To date, no ambient air samples were needed to be collected.

The soil gas and ambient air sample results will be compared against the short-term SGC values (e.g., 180,000 µg/m<sup>3</sup> for VCM). The short-term values were selected because the biosparge system is being installed in open areas on which only the occasional person traversing the area to get from one location to another is present. Sample collection and analyses will be performed in accordance with the procedures presented in the updated OU-3 QAPP.

#### **7.4.3      PROCESS MONITORING**

Injection header pressure and temperature as well as injection on/off cycle times and quantities of materials injected are being monitored and stored by the HMI software on the PC. In addition, in accordance with 40 CFR 144.27, the liquid supplements will be sampled and analyzed prior to their use, if needed (TOC for the sugar by-product solution and phosphorus and nitrogen for the DAP). The data will allow estimates to be made of the quantities of materials injected at each point (i.e., the quantity of an injected gas is a function of volume, pressure, and time). These mass estimates will be used to evaluate the distribution of the injected materials at each injection point and, in conjunction with the soil gas and groundwater monitoring, will be used to assist in optimizing the timing, locations, and rates of material injection. The data will be used to assess the rate of VCM biodegradation, injection material distribution and migration, and monitor groundwater flow pathways.

## 7.5 REMEDY LOGIC

The remedy logic is based upon the redox conditions, VCM concentrations, and TOC concentrations measured in the monitoring wells in the vicinity of the injections. The primary goal of the injections is to create an aerobic environment. The collected data will be used to assess what actions may be necessary to improve the remedy.

Dissolved Oxygen	<ul style="list-style-type: none"><li>• The desired concentration is <math>&gt;2</math> mg/L</li><li>• If <math>&lt;2</math> mg/L, the options are:<ul style="list-style-type: none"><li>– Increase the length of time of oxygen injection</li><li>– Increase the frequency of oxygen injection</li><li>– Increase the volume of oxygenated water injection</li><li>– Install an additional injection well at the midpoint between the injection wells</li></ul></li></ul>
TOC	<ul style="list-style-type: none"><li>• The desired concentration is <math>5 \leq \text{TOC} \leq 10</math> mg/L</li><li>• If <math>&lt;5</math> mg/L, the options are:<ul style="list-style-type: none"><li>– Increase the injection volume</li><li>– Increase the injection frequency</li><li>– Check whether the VCM concentration is decreasing</li><li>– Evaluate other injection materials</li></ul></li></ul>
VCM	<ul style="list-style-type: none"><li>• The measured concentrations should be decreasing</li><li>• If not decreasing:<ul style="list-style-type: none"><li>– Increase the dissolved oxygen and/or TOC concentration</li><li>– Install additional injection wells at the midpoint between the injection wells</li><li>– Install additional injection wells at strategic locations in the south portion of the subplume</li></ul></li></ul>

Of the above three parameters, the VCM concentration is the critical parameter. If the VCM concentrations are decreasing and are consistent with meeting the remediation objectives, the need to achieve the desired concentrations for DO and TOC is not imperative.

## **7.6        EVALUATION/MODIFICATION OF MONITORING PROGRAMS**

The scope of the groundwater monitoring and vadose zone monitoring will be evaluated 2 years after the entire biosparge system is operational (in 2014) and thereafter at 3-year intervals. Based on the evaluation, the scope of monitoring may be modified for the next 3-year period. EPA concurrence will be obtained prior to implementation of any modifications.

## **7.7        REPORTING**

The reporting schedule shall be:

- i)        Quarterly progress reports with Region 2 EDD format submittal of sampling data until 1 year after startup of the remainder of the biosparge system (September 2013)
- ii)       Semi-annual progress reports thereafter
- iii)      The Final O,M & M Manual for the Biosparge System to be submitted in October 2012.

The quarterly and annual progress reports will contain validated biosparge system performance monitoring data as they become available.

## **7.8        INSPECTIONS**

It is anticipated that inspections will be performed by the EPA on an as-desired schedule as O, M & M is ongoing.

## **7.9        POTENTIAL PROBLEMS WITH FUTURE BIOSPARGE SYSTEM OPERATION**

This section describes some of the potential problems that may occur in the future with the biosparge system operations. The currently foreseen potential problems are:

- i)        Failure of selected system components (e.g., valves, actuators, flow meters, etc.). Spares have been purchased and are on-Site to expedite system repairs should the need arise.

- ii) Plugging of injection well screens. This has previously occurred and the injected wells were redeveloped. When well plugging occurs in the future, the wells will be videoed with a downhole camera to determine the cause of the plugging (e.g., infilling with sediment, encrustation of the well screen with precipitated, etc.) and the appropriate well rehabilitation method will be used.

As previously stated in this report, problems with the main compressor have occurred in the past and are possible in the future. To address this potential, an auxiliary compressor has been purchased and installed.



## 8.0 OBSERVATIONS AND LESSON LEARNED

Observations and lessons learned have been described in previous sections of the report. They are summarized in the following:

Based on the results of the years of performance of the Pilot System, the following changes were included in the design of the remainder of the biosparge system injection wells:

- i) Increase the diameter of the water and air injection wells from 1 to 1.25 inch
- ii) Install the water injection well and shallow air injection well in separate sandpacked intervals
- iii) Install a steel plate on the bottom of the air injection wells to prevent settling of the wells
- iv) Install a spacer in the upper 0 to 20 feet of the injection well nests to maintain separation between the wells at the ground surface
- v) The HMI and controls have been upgraded so that should a shutdown be required of a select set of injection wells, the remainder of the system will remain operational
- vi) The ability to monitor and operate the system remotely has been enhanced
- vii) Water injections are not performed while air is being injected to prevent the air injection from entering and blocking the water line

In addition, the purchase and installation of the auxiliary compressor was based on lessons learned during operation of the Pilot System.

## 9.0 CONTACT INFORMATION

### **Glenn Springs Holdings, Inc.**

Mr. Roger Smith - Sr. Project Manager -----972-687-7516 (office)  
----- 817-975-8705 (cell)  
Mr. Barry Hanlon - HES Director -----972-687-7508 (office)  
----- 859-619-7212 (cell)  
Mr. Mike Anderson - President-----972-687-7501 (office)  
----- 859-396-3767 (cell)  
----- 214-484-8803 (home)

### **CRA**

Process Manager - Julian Worrall -----716-297-6150 (office)  
----- 716-773-6111 (home)  
Systems Operator - Tom Pestka -----716-297-6150 (office)  
----- 716-832-5042 (home)  
Project Manager - Jim Kay -----519-884-0510 (office)  
----- 519-699-5907 (home)  
Technical Advisor - Kevin Lynch ----- Cell: 716-471-3892

### **Property Owners**

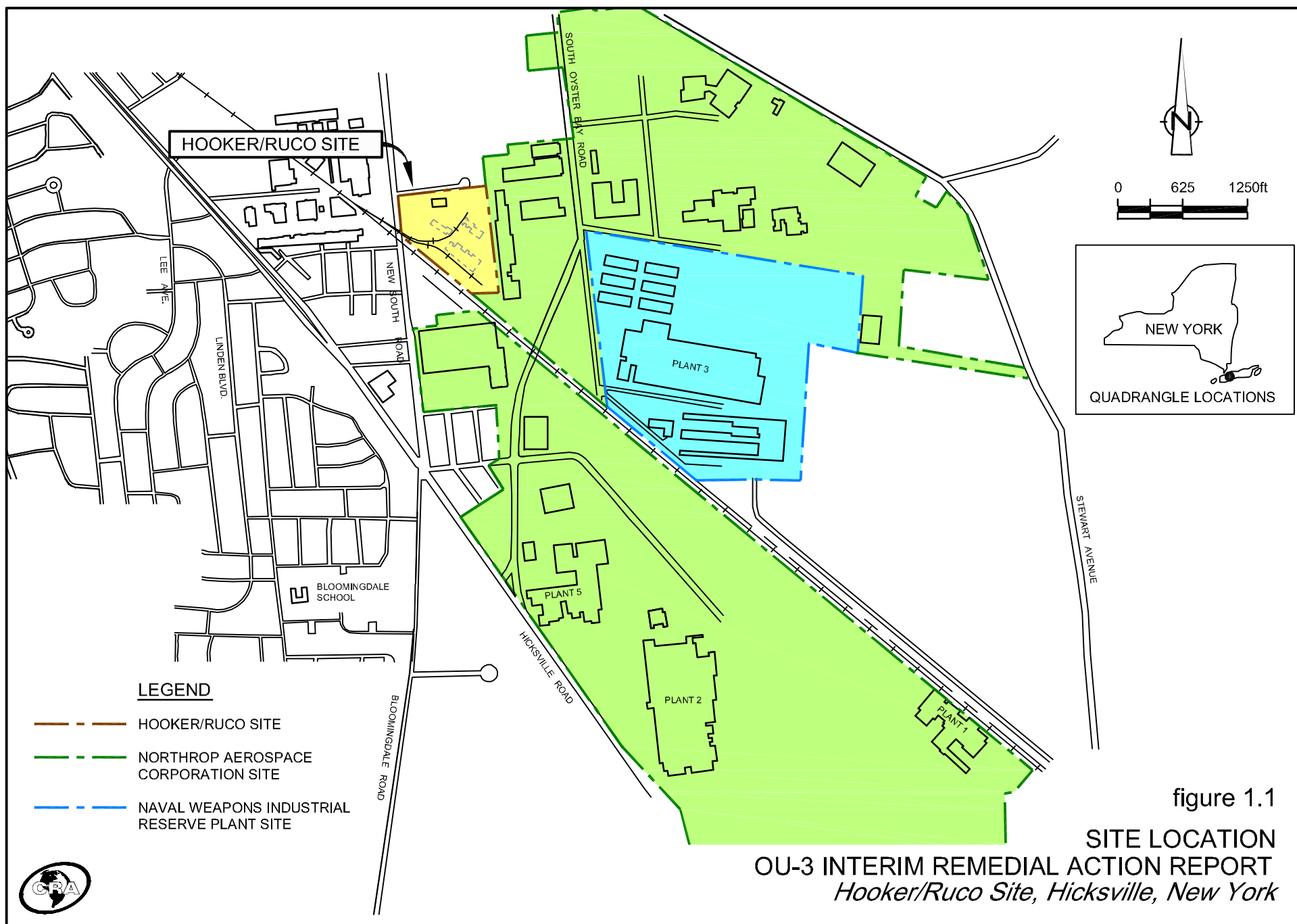
Bayer Corporation (Mr. Ramon Simon)-----281-383-6149  
----- 832-205-3149 (cell)  
Northrop (Mr. Edward Hannon) -----516-575-2333  
----- 516-353-4618 (cell)  
-----516-575-3333 (24-hr emergency)  
Steel Equities (Kevin Lumpe) -----516-576-3165  
Sleepy's Mattress (Vir Yabut) -----516-861-8800

### **Agency Contacts**

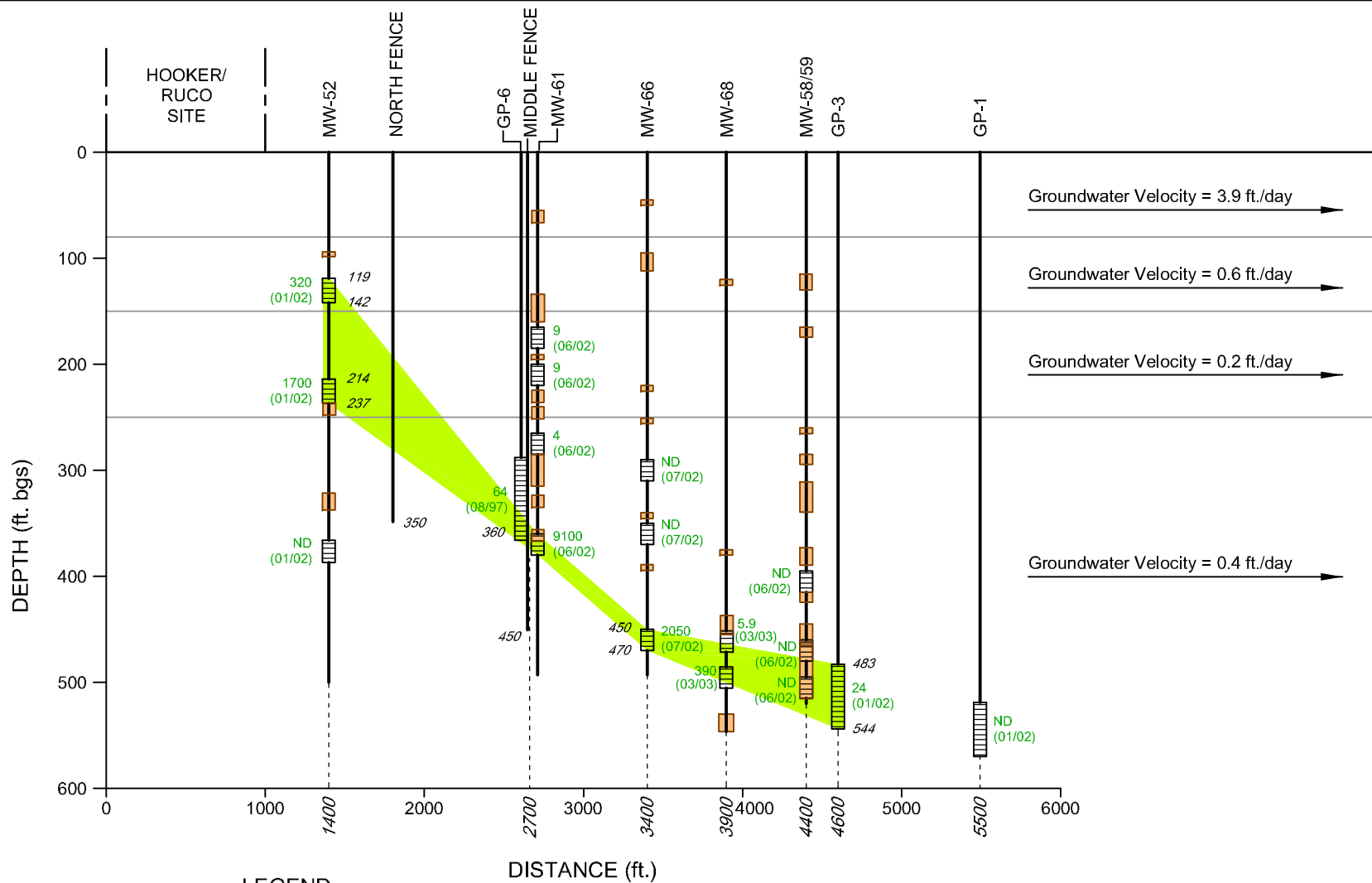
United States Environmental Protection Agency (Mr. Thomas Taccone)---212-637-4281  
New York State Department of Environmental  
Conservation (Stephen Scharf) -----518-402-9620

### **Alarm Firm**

Electronix Systems Central Station Alarms, Inc. -----Office 631-271-4000  
----- Central Station 631-271-9075





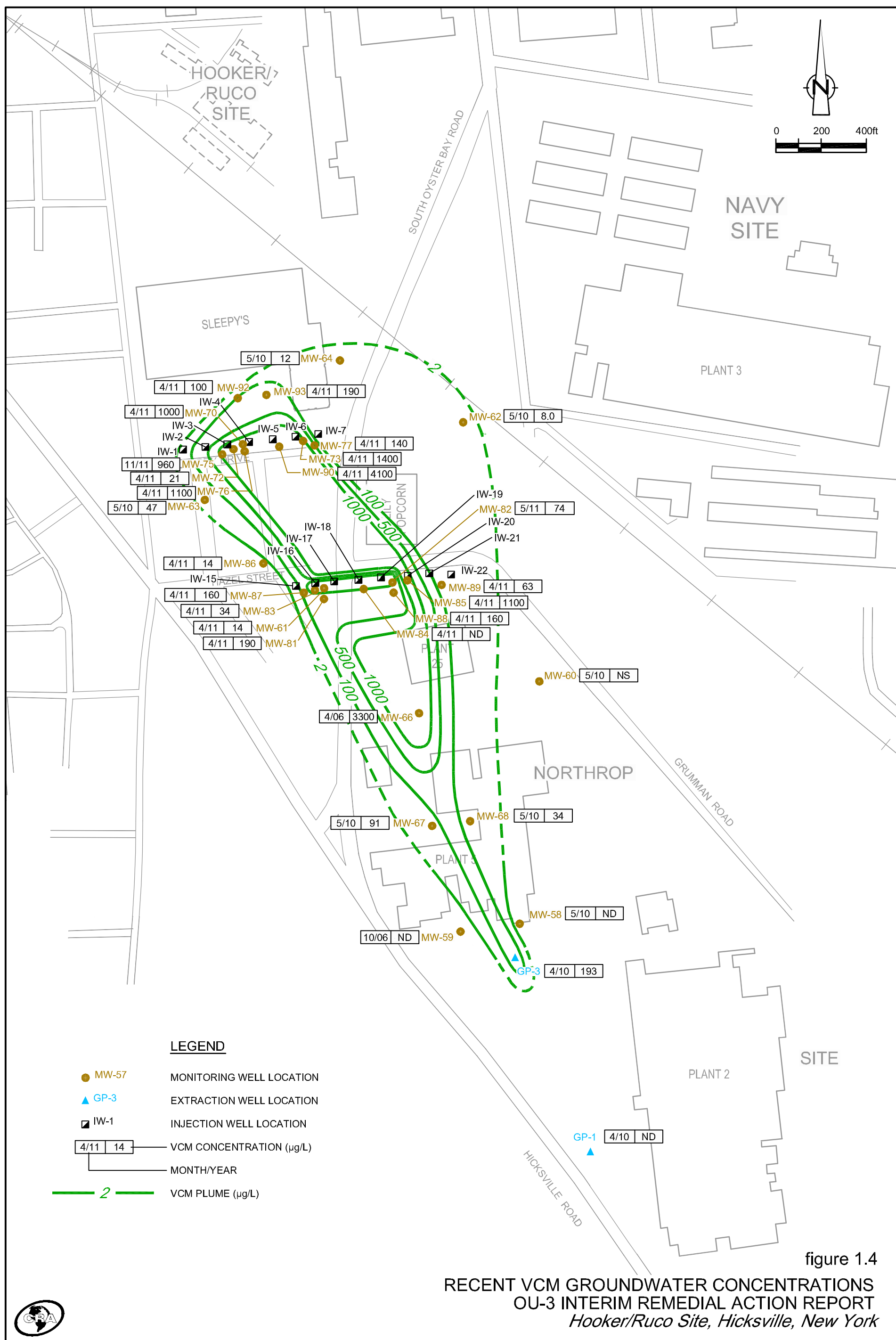


#### LEGEND

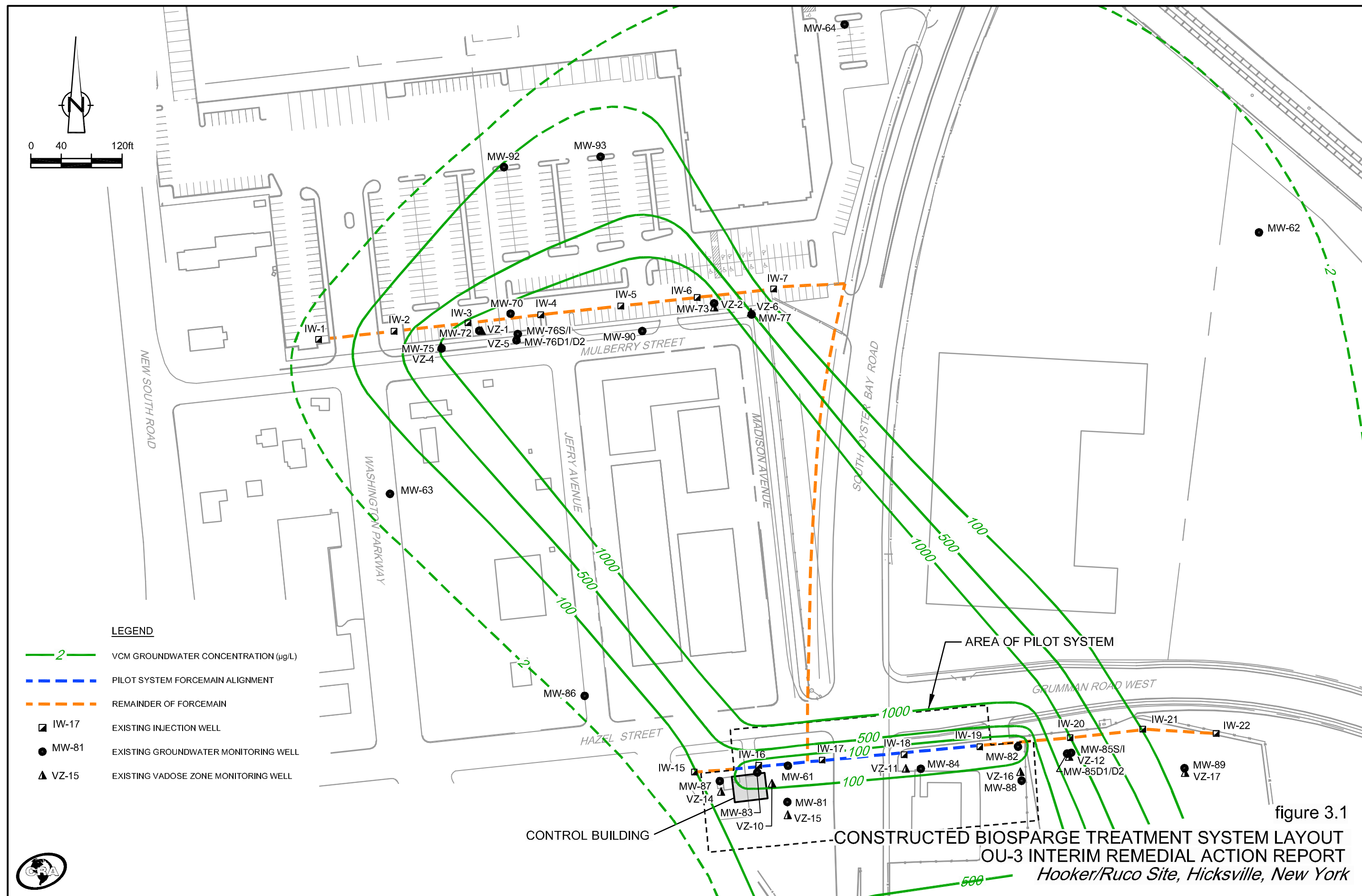
- WELL SCREEN
- 2000 VCM CONCENTRATION (µg/L)
- (09/00) MONTH/YEAR
- VCM SUBPLUME
- 380 DEPTH (ft. bgs)
- LOW PERMEABLE INTERVAL

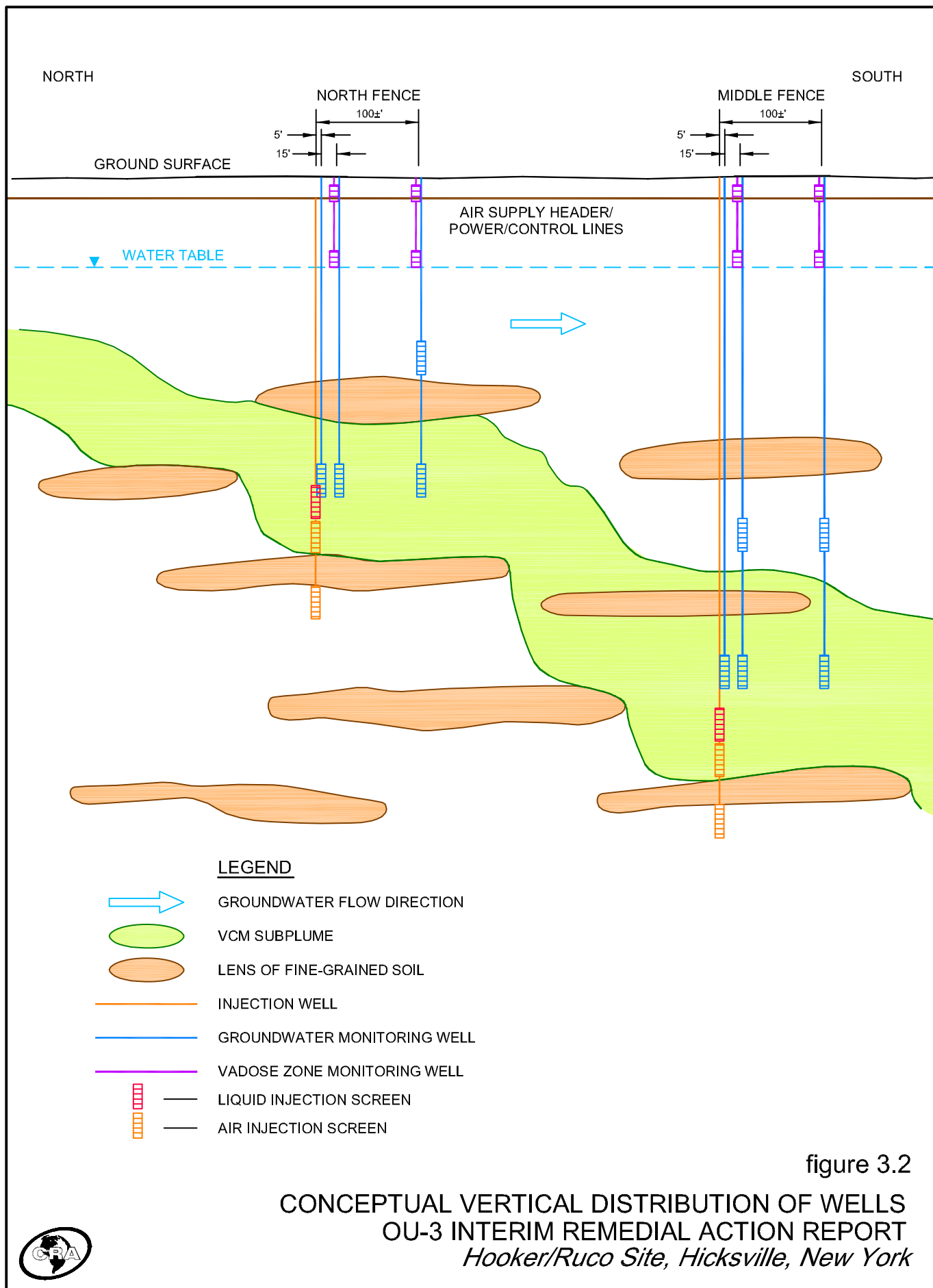
figure 1.3  
 HISTORIC VCM SUBPLUME CROSS-SECTION SCHEMATIC  
 OU-3 INTERIM REMEDIAL ACTION REPORT  
*Hooker/Ruco Site, Hicksville, New York*



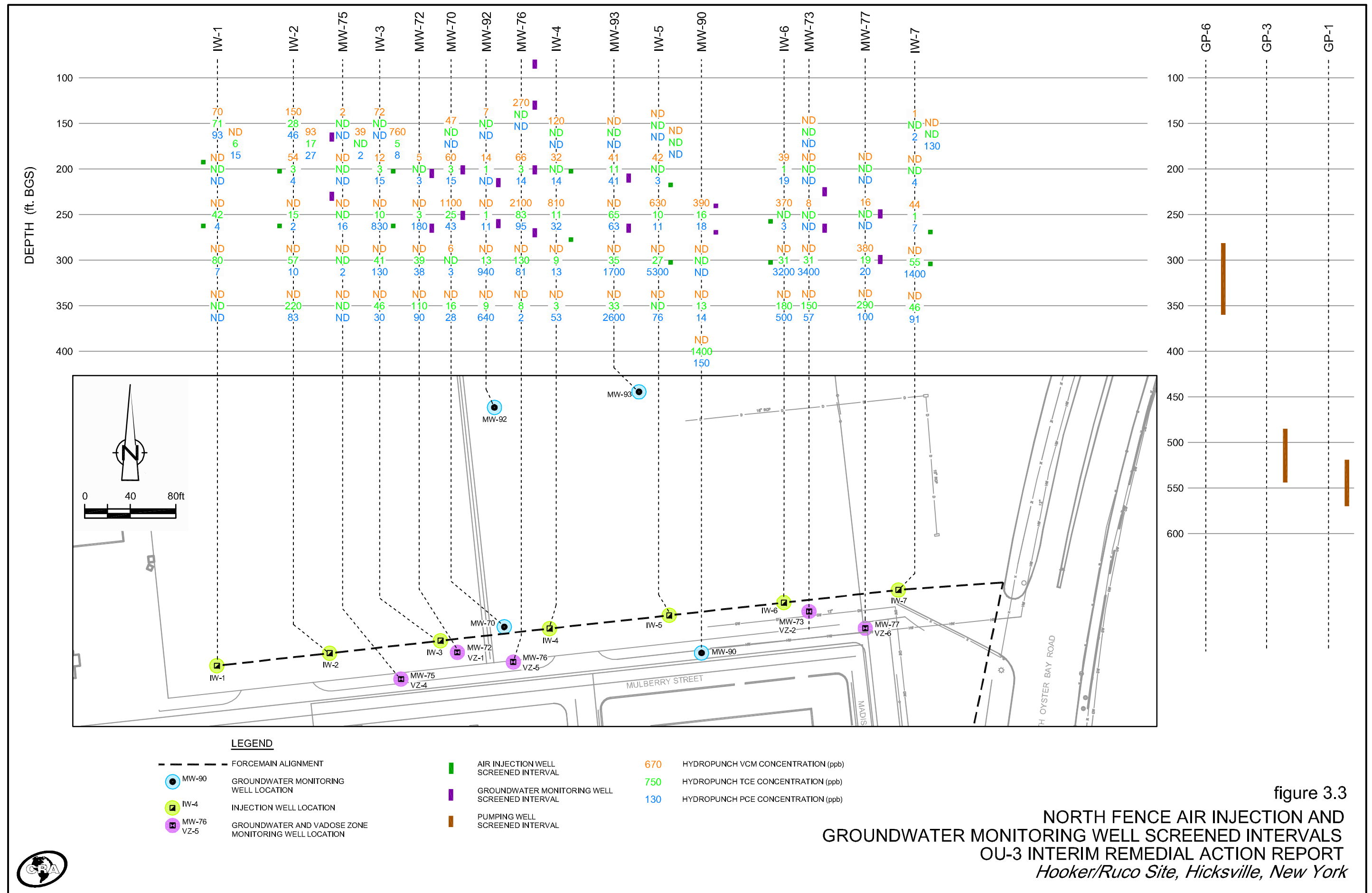












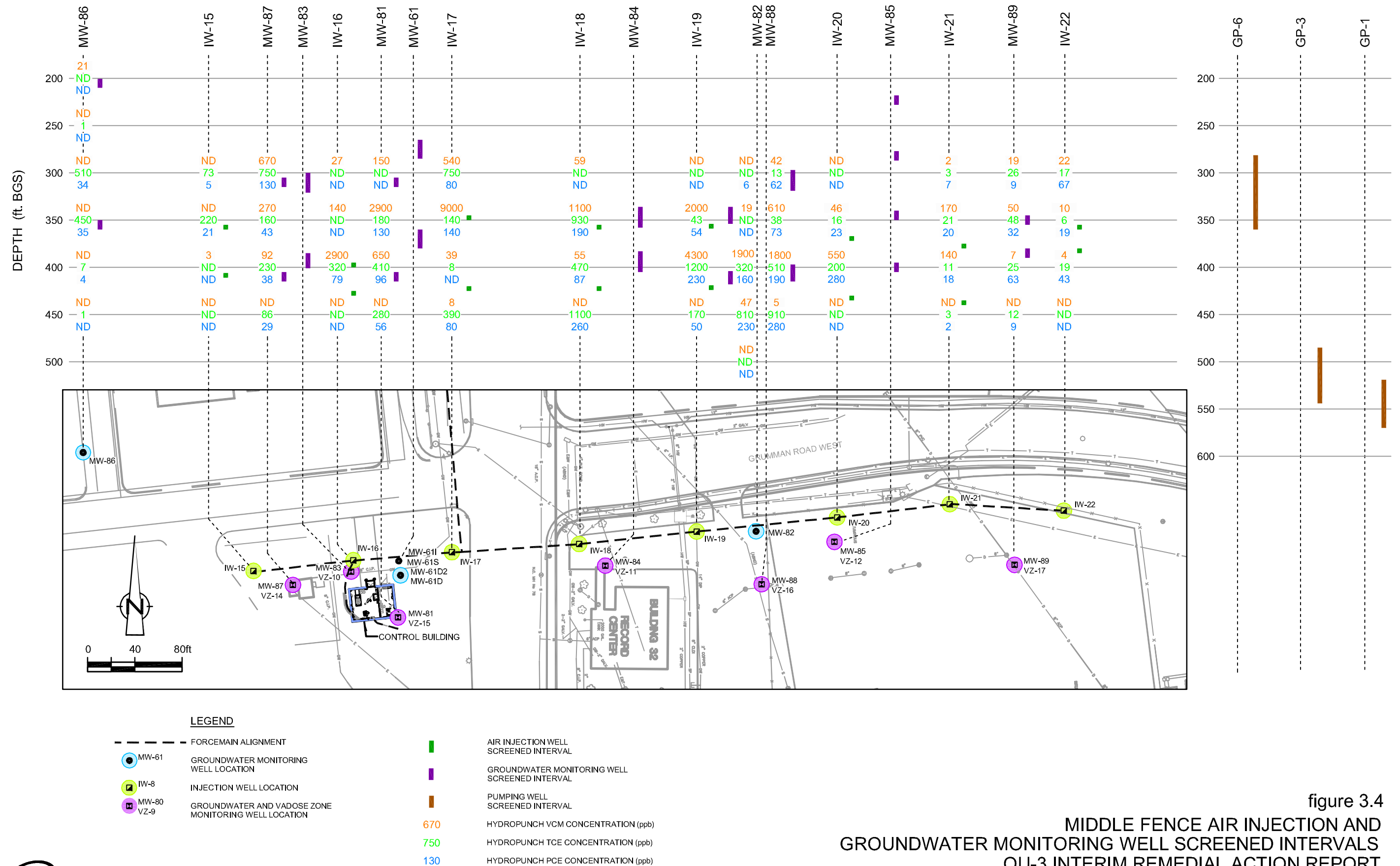


figure 3.4  
MIDDLE FENCE AIR INJECTION AND  
GROUNDWATER MONITORING WELL SCREENED INTERVALS  
OU-3 INTERIM REMEDIAL ACTION REPORT  
Hooker/Ruco Site, Hicksville, New York









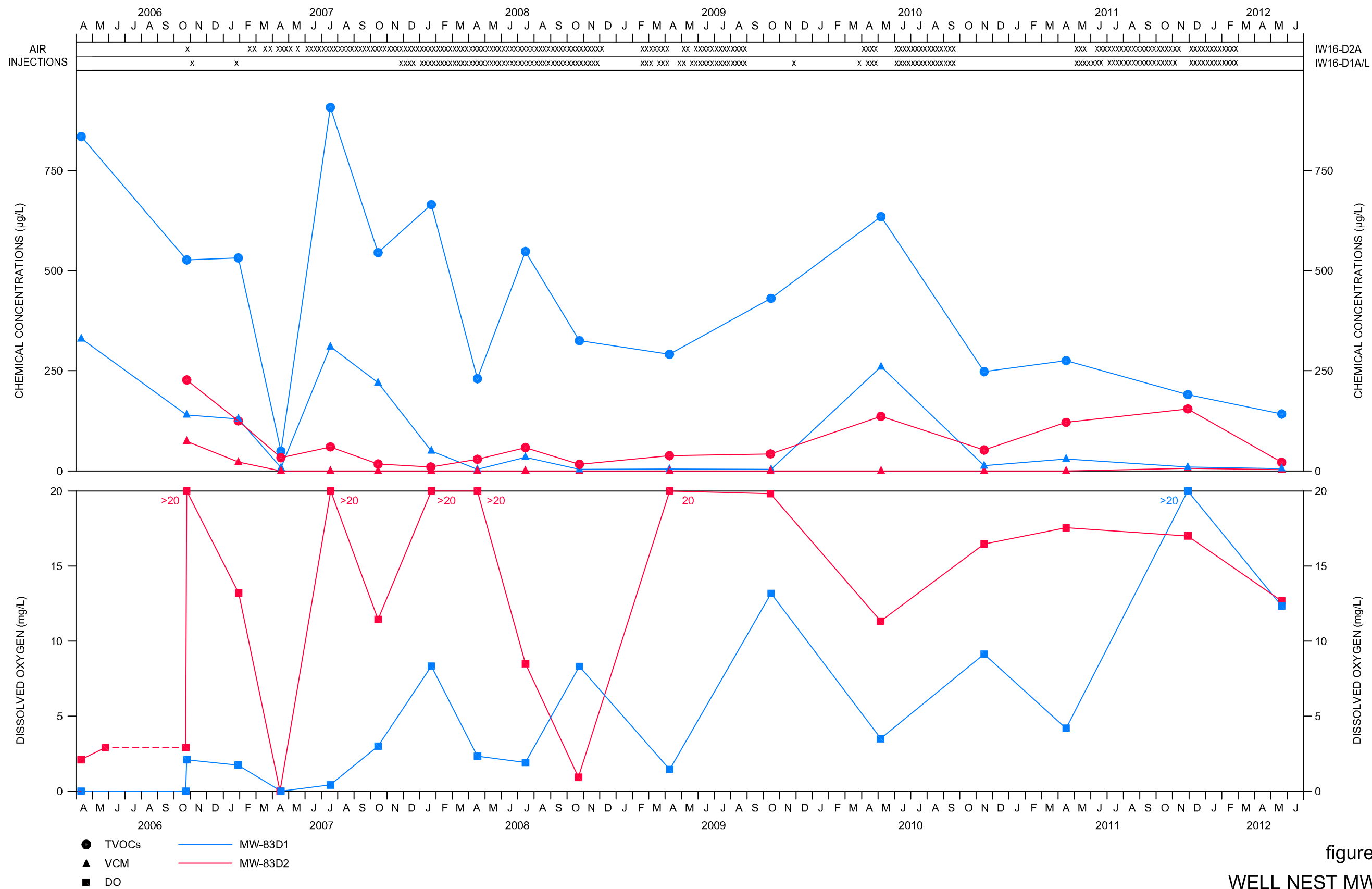


figure 5.4

WELL NEST MW-83  
CHEMICAL CONCENTRATION PLOTS - MIDDLE INJECTION FENCELINE  
OU-3 INTERIM REMEDIAL ACTION REPORT  
Hooker/Ruco Site, Hicksville, New York



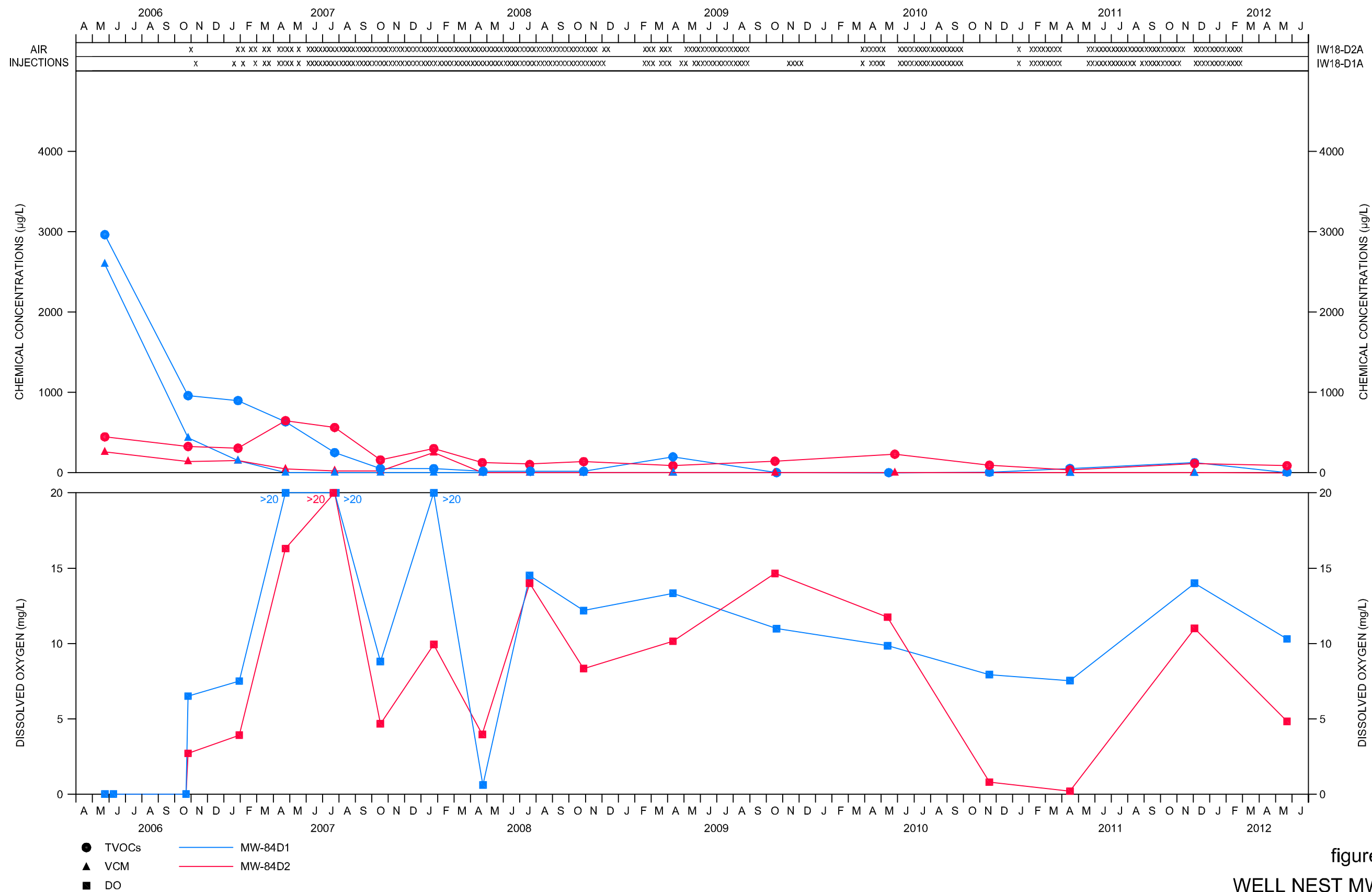


figure 5.5  
 WELL NEST MW-84  
 CHEMICAL CONCENTRATION PLOTS - MIDDLE INJECTION FENCELINE  
 OU-3 INTERIM REMEDIAL ACTION REPORT  
*Hooker/Ruco Site, Hicksville, New York*







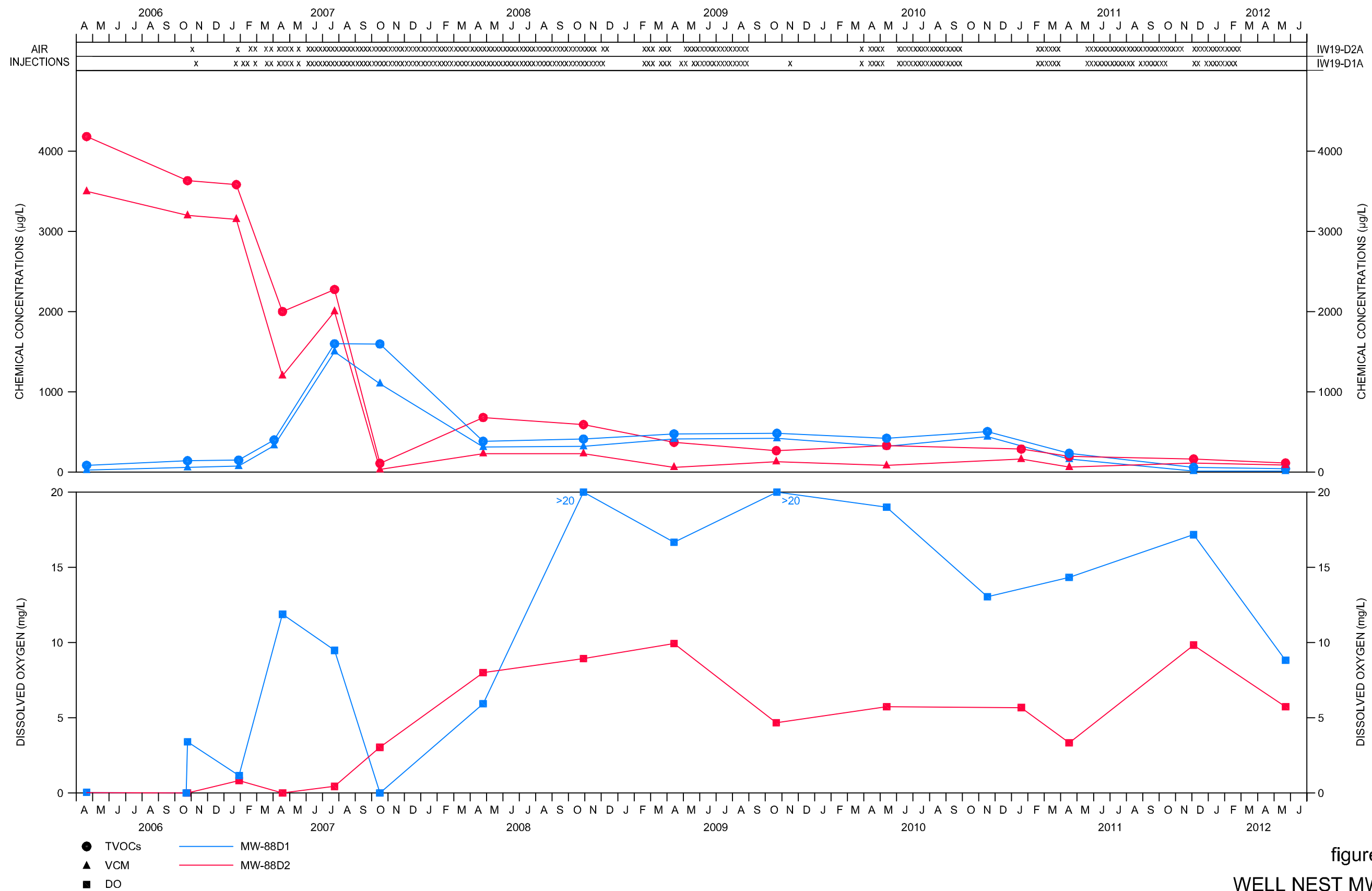


figure 5.7

WELL NEST MW-88  
 CHEMICAL CONCENTRATION PLOTS - MIDDLE INJECTION FENCELINE  
 OU-3 INTERIM REMEDIAL ACTION REPORT  
*Hooker/Ruco Site, Hicksville, New York*



TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<i>Sample Location:</i>	<i>MW-58D</i>	<i>MW-58D1</i>	<i>MW-61D1</i>	<i>MW-61D2</i>	<i>MW-61I</i>	<i>MW-61S</i>
	<i>Sample ID:</i>	GW51710VW020	GW51910MY021	GW51010VW010	GW51010VW013	GW51010VW011	GW51010VW012
	<i>Sample Date:</i>	5/17/2010	5/19/2010	5/10/2010	5/10/2010	5/10/2010	5/10/2010
<i>Parameters</i>	<i>Units</i>						
<i>Volatile Organic Compounds</i>							
1,1,1-Trichloroethane	µg/L	2.8 J	2.8 J	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	µg/L	5.0 U	5.0 U	5.0 U	1.9 J	5.0 U	5.0 U
1,1-Dichloroethene	µg/L	9.8	9.2	5.0 U	1.3 J	5.0 U	5.0 U
1,2-Dichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 UJ
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 UJ
Benzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane (Methyl bromide)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon disulfide	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroform (Trichloromethane)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane (Methyl chloride)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	1.3 J	1.2 J	5.0 U	29	5.0 U	5.0 U
cis-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	µg/L	18	18	6.3	120	6.9	5.4
Toluene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

		Sample Location:		MW-58D	MW-58D1	MW-61D1	MW-61D2	MW-61I	MW-61S
		Sample ID:	GW51710VW020	GW51910MY021	GW51010VW010	GW51010VW013	GW51010VW011	GW51010VW012	
		Sample Date:	5/17/2010	5/19/2010	5/10/2010	5/10/2010	5/10/2010	5/10/2010	
Parameters	Units								
Volatile Organic Compounds (Cont'd.)									
trans-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	µg/L	47	44	8.0 U	360	7.8 U	8.1 U		
Vinyl chloride	µg/L	5.0 U	5.0 U	1.8 J	240	1.6 J	3.5 J		
Xylene (total)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		
General Chemistry									
Ammonia-N	mg/L	-	-	0.150	0.319	0.150	0.164		
Nitrate (as N)	mg/L	-	-	0.815	2.31	0.536	0.840		
Nitrite (as N)	mg/L	-	-	0.0100 U	0.0100 U	0.0100 U	0.0100 U		
Nitrite/Nitrate	mg/L	-	-	-	-	-	-		
Phosphorus	mg/L	-	-	0.15	0.059	0.036	0.17		
Total organic carbon (TOC)	mg/L	-	-	10 U	10 U	10 U	10 U		

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

UJ - Estimated reporting limit.

- Not analyzed.

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<i>Sample Location:</i>	<i>MW-62D</i>	<i>MW-62S</i>	<i>MW-63D1</i>	<i>MW-63D2</i>	<i>MW-63I</i>	<i>MW-63S</i>
	<i>Sample ID:</i>	GW52510VW033	GW52510VW034	GW52410VW029	GW52410VW030	GW52110VW028	GW52110VW027
	<i>Sample Date:</i>	5/25/2010	5/25/2010	5/24/2010	5/24/2010	5/21/2010	5/21/2010
<i>Parameters</i>	<i>Units</i>						
<i>Volatile Organic Compounds</i>							
1,1,1-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	µg/L	2.5 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	µg/L	12	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane (Methyl bromide)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon disulfide	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	µg/L	1.1 J	5.0 U	3.2 J	3.4 J	3.7 J	2.1 J
Chloroform (Trichloromethane)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane (Methyl chloride)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	30	2.4 J	9.6	11	11	8.6
cis-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	µg/L	2.4 J	5.1 J	6.4 J	6.4 J	5.4 J	2.4 J
Toluene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

		Sample Location:						
		Sample ID:	MW-62D GW52510VW033	MW-62S GW52510VW034	MW-63D1 GW52410VW029	MW-63D2 GW52410VW030	MW-63I GW52110VW028	MW-63S GW52110VW027
		Sample Date:	5/25/2010	5/25/2010	5/24/2010	5/24/2010	5/21/2010	5/21/2010
Parameters		Units						
Volatile Organic Compounds (Cont'd.)								
trans-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Trichloroethene	µg/L	8.2	5.0 U	9.2	9.1	8.3	4.3 J	
Vinyl chloride	µg/L	8.0	4.2 J	35	46	47	16	
Xylene (total)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
General Chemistry								
Ammonia-N	mg/L	-	-	-	-	-	-	
Nitrate (as N)	mg/L	-	-	-	-	-	-	
Nitrite (as N)	mg/L	-	-	-	-	-	-	
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	
Phosphorus	mg/L	-	-	-	-	-	-	
Total organic carbon (TOC)	mg/L	-	-	-	-	-	-	

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

UJ - Estimated reporting limit.

- Not analyzed.

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<i>Sample Location:</i>	<i>MW-64D2</i>	<i>MW-64I</i>	<i>MW-64S</i>	<i>MW-67D</i>	<i>MW-67D</i>	<i>MW-67S</i>
	<i>Sample ID:</i>	<i>GW52410VW033</i>	<i>GW52410VW032</i>	<i>GW52410VW031</i>	<i>GW52010VW023</i>	<i>GW52010VW024</i>	<i>GW52010VW025</i>
	<i>Sample Date:</i>	<i>5/24/2010</i>	<i>5/24/2010</i>	<i>5/24/2010</i>	<i>5/20/2010</i>	<i>5/20/2010</i>	<i>5/20/2010</i>
<i>Parameters</i>	<i>Units</i>						
<i>Volatile Organic Compounds</i>							
1,1,1-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	µg/L	2.0 J	2.2 J	1.1 J	1.4 J	1.4 J	5.0 U
1,1-Dichloroethene	µg/L	5.0 U	5.0 U	5.0 U	1.6 J	1.2 J	5.0 U
1,2-Dichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.6
2-Hexanone	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	5.0 U	7.4	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.0 J
Bromodichloromethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane (Methyl bromide)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon disulfide	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.9
Chloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.4 J
Chloroform (Trichloromethane)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane (Methyl chloride)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	1.5 J	1.2 J	5.0 U	24	24	38
cis-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	µg/L	5.0 UJ	5.0 UJ	1.5 J	74	73	26
Toluene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.9 J
trans-1,2-Dichloroethene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGES SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

		Sample Location:		MW-64D2	MW-64I	MW-64S	MW-67D	MW-67D	MW-67S
		Sample ID:	GW52410VW033	GW52410VW032	GW52410VW031	GW52010VW023	GW52010VW024	GW52010VW025	
		Sample Date:	5/24/2010	5/24/2010	5/24/2010	5/20/2010	5/20/2010	5/20/2010	
Parameters	Units								
Volatile Organic Compounds (Cont'd.)									
trans-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Trichloroethene	µg/L	5.0 U	5.0 U	5.0 U	280	280 J	37		
Vinyl chloride	µg/L	11	12	2.1 J	5.0 U	5.0 U	87		
Xylene (total)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		
General Chemistry									
Ammonia-N	mg/L	-	-	-	-	-	-	-	
Nitrate (as N)	mg/L	-	-	-	-	-	-	-	
Nitrite (as N)	mg/L	-	-	-	-	-	-	-	
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	
Phosphorus	mg/L	-	-	-	-	-	-	-	
Total organic carbon (TOC)	mg/L	-	-	-	-	-	-	-	

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

UJ - Estimated reporting limit.

- Not analyzed.

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<i>Sample Location:</i>	MW-67S	MW-68D	MW-81D1	MW-81D2	MW-82D1	MW-82D2	MW-83D1
	<i>Sample ID:</i>	GW52010VW026	GW51910MY022	GW5610VW008	GW51010VW009	GW51210VW016	GW51210VW017	GW5510VW005
	<i>Sample Date:</i>	5/20/2010	5/19/2010	5/6/2010	5/10/2010	5/12/2010	5/12/2010	5/5/2010
		(Duplicate)						
<i>Parameters</i>	<i>Units</i>							
<i>Volatile Organic Compounds</i>								
1,1,1-Trichloroethane	µg/L	5.0 U	2.4 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	µg/L	5.0 U	2.4 J	5.0 U	1.0 J	3.2 J	2.0 J	5.0 U
1,1-Dichloroethene	µg/L	5.0 U	2.0 J	5.0 U	1.2 J	5.0 U	1.1 J	1.8 J
1,2-Dichloroethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	120	5.0 U	5.0 U
2-Hexanone	µg/L	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	16	5.0 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U
Benzene	µg/L	2.0 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane (Methyl bromide)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon disulfide	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	µg/L	6.2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	µg/L	4.4 J	5.0 U	23	5.0 U	5.0 U	5.0 U	3.7 J
Chloroform (Trichloromethane)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloromethane (Methyl chloride)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	37	5.9	13	5.0	3.9 J	11	33
cis-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	µg/L	27	320	16	14	16	100	96
Toluene	µg/L	2.9 J	5.0 U	5.4	5.0 U	5.0 U	4.0 J	5.0 U
trans-1,2-Dichloroethene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U



TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<i>Sample Location:</i>	<i>MW-67S</i>	<i>MW-68D</i>	<i>MW-81D1</i>	<i>MW-81D2</i>	<i>MW-82D1</i>	<i>MW-82D2</i>	<i>MW-83D1</i>
	<i>Sample ID:</i>	<i>GW52010VW026</i>	<i>GW51910MY022</i>	<i>GW5610VW008</i>	<i>GW51010VW009</i>	<i>GW51210VW016</i>	<i>GW51210VW017</i>	<i>GW5510VW005</i>
	<i>Sample Date:</i>	<i>5/20/2010</i>	<i>5/19/2010</i>	<i>5/6/2010</i>	<i>5/10/2010</i>	<i>5/12/2010</i>	<i>5/12/2010</i>	<i>5/5/2010</i>
		<i>(Duplicate)</i>						
<i>Parameters</i>	<i>Units</i>							
<i><b>Volatile Organic Compounds (Cont'd.)</b></i>								
trans-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	µg/L	39	970	99	63	64	92	240
Vinyl chloride	µg/L	95	34	180	5.0 U	5.0 U	7.1	260
Xylene (total)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
<i><b>General Chemistry</b></i>								
Ammonia-N	mg/L	-	-	0.744	0.486	0.100 U	1.02	0.200 U
Nitrate (as N)	mg/L	-	-	-	3.03	0.0100 U	1.96	-
Nitrite (as N)	mg/L	-	-	-	0.00819 J	0.0100 U	0.208	-
Nitrite/Nitrate	mg/L	-	-	0.192	-	-	-	1.99
Phosphorus	mg/L	-	-	0.17	0.038	0.033	0.071	0.047
Total organic carbon (TOC)	mg/L	-	-	10 U	10 U	10 U	10 U	10 U

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

UJ - Estimated reporting limit.

- Not analyzed.

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<i>Sample Location:</i>	<i>MW-83D2</i>	<i>MW-84D1</i>	<i>MW-84D2</i>	<i>MW-87D1</i>	<i>MW-87D1</i>	<i>MW-87D1</i>	<i>MW-87D2</i>
	<i>Sample ID:</i>	<i>GW5610VW007</i>	<i>GW51210VW018</i>	<i>GW52510VW036</i>	<i>GW5410VW001</i>	<i>GW5410VW002</i>	<i>GW5410VW003</i>	<i>GW5510VW004</i>
	<i>Sample Date:</i>	<i>5/6/2010</i>	<i>5/12/2010</i>	<i>5/25/2010</i>	<i>5/4/2010</i>	<i>5/4/2010</i>	<i>5/4/2010</i>	<i>5/5/2010</i>
<i>Parameters</i>	<i>Units</i>						<i>(Duplicate)</i>	
<i>Volatile Organic Compounds</i>								
1,1,1-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	1.9 J
1,1-Dichloroethene	µg/L	5.0 U	5.0 U	5.0 U	-	2.0 J	2.0 J	1.9 J
1,2-Dichloroethane	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Acetone	µg/L	5.0 U	5.0 U	4.8 J	-	5.0 U	5.0 U	5.0 U
Benzene	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Bromodichloromethane	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Bromoform	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Bromomethane (Methyl bromide)	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Carbon disulfide	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Chlorobenzene	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Chloroethane	µg/L	5.0 U	5.0 U	5.0 U	-	3.7 J	3.5 J	5.0 U
Chloroform (Trichloromethane)	µg/L	5.0 U	5.0 U	5.0 U	-	1.0 J	1.3 J	5.0 U
Chloromethane (Methyl chloride)	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	8.4	5.0 U	8.3	-	94	96	4.0 J
cis-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Dibromochloromethane	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Ethylbenzene	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Styrene	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Tetrachloroethene	µg/L	18	1.4 J	23 J	-	170	170	18
Toluene	µg/L	5.0 U	5.0 U	2.6 J	-	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<div> <div>Sample Location:</div> <div>MW-83D2</div> <div>MW-84D1</div> <div>MW-84D2</div> <div>MW-87D1</div> <div>MW-87D1</div> <div>MW-87D1</div> <div>MW-87D2</div> </div>							
	<div> <div>Sample ID:</div> <div>GW5610VW007</div> <div>GW51210VW018</div> <div>GW52510VW036</div> <div>GW5410VW001</div> <div>GW5410VW002</div> <div>GW5410VW003</div> <div>GW5510VW004</div> </div>							
	<div> <div>Sample Date:</div> <div>5/6/2010</div> <div>5/12/2010</div> <div>5/25/2010</div> <div>5/4/2010</div> <div>5/4/2010</div> <div>5/4/2010</div> <div>5/5/2010</div> </div>							
	<div> <div>(Duplicate)</div> </div>							
Parameters	Units							
<b>Volatile Organic Compounds (Cont'd.)</b>								
trans-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
Trichloroethene	µg/L	110	5.0 U	190	-	360	330	55
Vinyl chloride	µg/L	5.0 U	5.0 U	1.6 J	-	41	44	5.0 U
Xylene (total)	µg/L	5.0 U	5.0 U	5.0 U	-	5.0 U	5.0 U	5.0 U
<b>General Chemistry</b>								
Ammonia-N	mg/L	0.100 U	0.100 U	1.14	1.18	1.06	1.11	0.200 U
Nitrate (as N)	mg/L	-	3.26	1.81 J	-	-	-	-
Nitrite (as N)	mg/L	-	0.0100 U	0.00677 J	-	-	-	-
Nitrite/Nitrate	mg/L	4.99	-	-	3.36	3.28	3.08	4.65
Phosphorus	mg/L	0.13	0.053	0.030 U	-	0.14	0.14	0.16
Total organic carbon (TOC)	mg/L	10 U	10 U	10 U	-	10 U	10 U	10 U

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

UJ - Estimated reporting limit.

- Not analyzed.

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<i>Sample Location:</i> <i>MW-88D1</i> <i>MW-88D2</i> <i>MW-90D2</i> <i>Sample ID:</i> <i>GW51110VW015</i> <i>GW51110VW014</i> <i>GW51710VW019</i> <i>Sample Date:</i> <i>5/11/2010</i> <i>5/11/2010</i> <i>5/17/2010</i>			
<i>Parameters</i>	<i>Units</i>			
<i>Volatile Organic Compounds</i>				
1,1,1-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	µg/L	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	µg/L	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	µg/L	5.0 U	1.6 J	1.3 J
1,1-Dichloroethene	µg/L	5.0 UJ	5.0 U	5.0 U
1,2-Dichloroethane	µg/L	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	µg/L	5.0 U	5.0 U	5.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	6.7	5.0 U	5.0 U
2-Hexanone	µg/L	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U
Acetone	µg/L	5.0 U	5.0 U	5.0 U
Benzene	µg/L	5.0 U	5.0 U	5.0 U
Bromodichloromethane	µg/L	5.0 U	5.0 U	5.0 U
Bromoform	µg/L	5.0 U	5.0 U	5.0 U
Bromomethane (Methyl bromide)	µg/L	5.0 U	5.0 U	5.0 U
Carbon disulfide	µg/L	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	µg/L	5.0 U	5.0 U	5.0 U
Chlorobenzene	µg/L	1.7 J	5.0 U	5.0 U
Chloroethane	µg/L	12	5.0 U	5.0 U
Chloroform (Trichloromethane)	µg/L	5.0 U	5.0 U	5.0 U
Chloromethane (Methyl chloride)	µg/L	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	µg/L	19	26	6.8
cis-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U
Dibromochloromethane	µg/L	5.0 U	5.0 U	5.0 U
Ethylbenzene	µg/L	5.0 U	5.0 U	5.0 U
Methylene chloride	µg/L	5.0 U	5.0 U	5.0 U
Styrene	µg/L	5.0 U	5.0 U	5.0 U
Tetrachloroethene	µg/L	28	130	26
Toluene	µg/L	5.0 U	6.1	5.0 U
trans-1,2-Dichloroethene	µg/L	5.0 U	5.0 U	5.0 U

TABLE 2.1

**ANALYTICAL RESULTS SUMMARY - GROUNDWATER  
BIOSPARGE SYSTEM PERFORMANCE SAMPLING  
GLENN SPRINGS HOLDINGS, INC.  
HOOKER-RUCO SITE  
HICKSVILLE, NEW YORK  
MAY 2010**

	<i>Sample Location:</i> <i>MW-88D1</i> <i>MW-88D2</i> <i>MW-90D2</i> <i>Sample ID:</i> <i>GW51110VW015</i> <i>GW51110VW014</i> <i>GW51710VW019</i> <i>Sample Date:</i> <i>5/11/2010</i> <i>5/11/2010</i> <i>5/17/2010</i>			
<i>Parameters</i>	<i>Units</i>			
<i>Volatile Organic Compounds (Cont'd.)</i>				
trans-1,3-Dichloropropene	µg/L	5.0 U	5.0 U	5.0 U
Trichloroethene	µg/L	32	85	68
Vinyl chloride	µg/L	320	81	2.1 J
Xylene (total)	µg/L	1.5 J	5.0 U	5.0 U
<i>General Chemistry</i>				
Ammonia-N	mg/L	0.100 U	0.248	-
Nitrate (as N)	mg/L	0.0100 U	1.11	-
Nitrite (as N)	mg/L	0.00778 J	0.0324	-
Nitrite/Nitrate	mg/L	-	-	-
Phosphorus	mg/L	0.073	0.20	-
Total organic carbon (TOC)	mg/L	10 U	10 U	-

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

UJ - Estimated reporting limit.

- Not analyzed.

TABLE 3.1

**CHRONOLOGY OF REMEDIAL ACTION IMPLEMENTATION ACTIVITIES  
OPERABLE UNIT-3 (OFF-SITE GROUNDWATER)  
HOOKER/RUCO SITE, HICKSONVILLE, NEW YORK**

<i>Date</i>	<i>Description</i>
September 29, 2000	OU-3 ROD finalized by EPA.
April 26, 2001	Administrative Order Index No. II-CERCLA-02-2001-2010 issued.
January 23, 2002	Revised OU-3 SOW submitted to EPA.
February 8, 2002	Revised OU-3 SOW approved by EPA.
February to November 22, 2002	Performed predesign activities. Off-Site Groundwater Predesign Information Report (PDIR) submitted to EPA.
April to September 1, 2002	Construct Supplemental Treatment System. for Northrop GP-1/GP-3 Treatment System
August 16, 2002	O&M Plan for Supplemental Treatment System provided to Northrop.
March 6, 2003	EPA comments received on the Off-Site Groundwater Pre-design Information report
March 27, 2003	Responses submitted to EPA PDIR comments.
June 25, 2003	Additional EPA comments received on PDIR.
July 9, 2003	Supplemental Treatment System starts full-time operation.
July 29, 2003	Responses submitted to additional EPA PDIR comments EPA considers the PDIR to be the 30% Design Report.
September, 2003	Lag bed of Supplemental Treatment System converted from granular activated carbon to potassium permanganate to handle VCM more efficiently.
October 31, 2003	Pre-Final (95%) Remedial Design Report submitted to EPA.
April 12, 2004	EPA comments received on the 95% Design Report.
May 27, 2004	Responses submitted to EPA comments on the 95% Design Report.
November 17, 2004	EPA comments received on May 27 responses.
December 6, 2004	Responses submitted to November 17 EPA comments.
January 5, 2005	EPA approval received for closure of 6 off-Site and 20 on-Site groundwater monitoring wells.
January 12, 2005	EPA comments received on December 6 responses.
February 1, 2005	Responses submitted to January 12 EPA comments.
March 14, 2005	Redlined Final 100% submitted to EPA.
May 2005	Request for Bid for Pilot System well installation distributed May 19. Request for Bid for remaining components of Pilot System distributed May 20. 100% Final Design Report submitted May 27.
June 2005	Bids for Pilot System well installation received June 8. Bids for remaining components of Pilot System received June 10.

TABLE 3.1

**CHRONOLOGY OF REMEDIAL ACTION IMPLEMENTATION ACTIVITIES  
OPERABLE UNIT-3 (OFF-SITE GROUNDWATER)  
HOOKER/RUCO SITE, HICKSONVILLE, NEW YORK**

<i>Date</i>	<i>Description</i>
July 2005	EPA approval received July 7 of 100% Final Design Report. Contract for remaining components of Pilot System awarded to a.d. Winston July 11. Contract for Pilot System well installation awarded to Prosonic July 22.
August 2005	Prosonic started to mobilize to the Site August 30.
September 2005	Pre-Construction meeting held on September 6 to discuss emergency contingency plans/procedures with local providers. Prosonic started borehole drilling and well installation on September 13 for the Pilot System.
November 2005	A.D. Winston mobilized to the Site the week of November 7 and started installation of the Biosparge Pilot System Control Building and underground components.
December 2005	Meeting held with EPA on December 8 to provide project update.
January 2006	Approval received January 31 from Nassau County Department of Public Work to discharge well installation and development water to the Cedar Creek WPCP for a period of 1 year.
February 2006	Twenty wells on the Site property were abandoned.
March 2006	Draft Declaration of Covenants and Restrictions for the Site was submitted by Bayer (current property owner) on March 20. Background sampling of the Pilot System groundwater monitoring wells started March 27. Approximately 15,000 gallons of well installation/development water discharged to the Cedar Creek WPCP.
April 2006	Approximately 15,000 gallons of well installation/development water discharged to the Cedar Creek WPCP. Installation of the Pilot System wells completed. Shakedown and startup of the Pilot System commenced.
May 2006	Six off-Site wells abandoned. Development of Pilot System wells completed. Prosonic demobilized May 10, 2006. Approximately 15,000 gallons of well installation/development water discharged to the Cedar Creek WPCP.
June 2006	Excess drill cuttings transported to and disposed of at the BFI Conestoga Landfill located in Morganstown, PA. Background sampling of the groundwater monitoring wells was completed June 14.
July 2006	The eight remaining on-Site wells were abandoned.
August 2006	USEPA provided Northrop letter dated August 4 supporting the use of treated groundwater from Northrop's GP-1/GP-3 treatment system for injection by GSHI. Northrop submitted application to the New York State Public Service Commission August 8 requesting permission to provide up to 20 gpm of treated water Northrop's GP-1/GP-3 treatment system to GSHI.
September 2006	Shakedown and startup of the Pilot System was completed. Pre-Final Inspection held on September 14.

TABLE 3.1

**CHRONOLOGY OF REMEDIAL ACTION IMPLEMENTATION ACTIVITIES  
OPERABLE UNIT-3 (OFF-SITE GROUNDWATER)  
HOOKER/RUCO SITE, HICKSONVILLE, NEW YORK**

<i>Date</i>	<i>Description</i>
October 2006	Pre-Start monitoring for the Pilot System was performed on October 24, 26, and 26. Final Inspection held on October 27 Pilot System becomes fully operational.
November 2006	New York State Public Service Commission approval received November 13 to inject treated water from Northrop's GP-1/GP-3 treatment system. Pilot System shutdown due to observed release of air and groundwater from monitoring well MW-61D2 on November 18. Performance monitoring for the Pilot System was performed on November 28, 29, and 30.
January 2007	Certificate of Occupancy received January 11 from the Town of Oyster Bay Department of Planning and Development. Noise survey of Biosparge Control Building performed on January 18. Biosparge System restarted January 19. Performance monitoring for the Pilot System was performed on January 22 to 30. Injection of treated water from Northrop started on January 22.
February 2007	Pilot System "As-Recorded" Construction Drawings, well stratigraphy and instrumentation logs, Draft O&M Manual and HASP were submitted to EPA on February 1. Notice received February 27 from Steel Equities regarding impending development of former Northrop Plant 12 property. Notice included request to abandon well nest MW-52. Notification regarding this request submitted February 28 to EPA.
March 2007	Well nest MW-52 was sampled March 13 and 14 and abandoned on March 16 and 19. Approval received March 26 from Nassau County Department of Public Works to discharge well purge water to the Cedar Creek WPCP for a period of one year.
April 2007	Performance monitoring for the Pilot System was performed from April 18 to 27.
May 2007	Steel Equities provided on May 12 the updated redevelopment plan for the former Northrop Plant 12 property.
June 2007	Discussions held during June 18 conference call with the EPA, NYSDEC, MSRMI (nka GSHI) and CRA. It was agreed that TICs had been adequately addressed. TICs will no longer be analyzed for.
July 2007	Air injection well IW16-D1A was redeveloped on July 23. Performance monitoring for the Pilot System was performed from July 16 to 27.
September 2007	Specifications and Drawings for the north fence were provided to Steel Equities on September 7. Quotes for the north fence underground components were requested.
October 2007	Performance monitoring for the Pilot System was performed from October 8 to 18.
January 2008	Recommended modifications to the Biosparge System design and operations were provided in Fourth Quarter 2007 progress report dated January 15. Performance monitoring for the Pilot System was performed from January 27 to 28.
March 2008	Update of Biosparge System provided at March 19 Technical Advisory Committee (TAC) meeting. Approval received March 21 from Nassau County Department of Public Works for discharge of well development and purge water to the Cedar Creek WPCP for a period of 1 year.
April 2008	Performance monitoring for the Pilot System was performed from April 16 to 25. Bids for Plant 12 underground components received.



TABLE 3.1

**CHRONOLOGY OF REMEDIAL ACTION IMPLEMENTATION ACTIVITIES  
OPERABLE UNIT-3 (OFF-SITE GROUNDWATER)  
HOOKER/RUCO SITE, HICKSONVILLE, NEW YORK**

<i>Date</i>	<i>Description</i>
July 2008	The Marcus Organization was selected on July 28 as contractor for the underground components of north fence. Performance monitoring for the Pilot System was performed from July 15 to 18.
September 2008	Installation of the underground components of the Biosparge System north fence located on Steel Equities/Sleepy's property started September 29.
October 2008	Performance monitoring for the Pilot System was performed from October 20 to 31.
December 2008	Pilot System shutdown due to observed release of air and groundwater from MW-61D2 on December 8. Installation of the underground components of the Biosparge System north fence on Steel Equities/Sleepy's property was completed the week of December 22.
January 2009	Pilot System groundwater monitoring well vaults modified and replaced.
February 2009	Pilot System restarted February 17.
March 2009	Approval received March 16 from Nassau County Department of Public Works for discharge of purge water to Cedar Creek WPCP for a 1 year period.
June 2009	"As-Built" drawings for the north fence components received from The Marcus Organization on June 3.
August 2009	The SCADA PC software and network were upgraded. The PLC processor was replaced due to this upgrade. Biosparge System air compressor failed on August 24. EPA comments on the Biosparge System progress reports, the draft O&M Manual and the HASP were received on August 27.
September 2009	Responses to the EPA comments were submitted on September 23.
October 2009	Performance monitoring of the Pilot System was performed from October 13 to 21.
November 2009	A meeting was held November 4 among the EPA, GSHI, and CRA. During the meeting EPA agreed that the Biosparge System was working as designed. The Biosparge System air compressor was believed to be repaired on November 9. Injection into the shallow injection wells attempted on November 9. Attempts were unsuccessful. Additional evaluations of air compressor performed. Information supporting the effectiveness of the Biosparge System was submitted on November 30.
January 2010	EPA letter received on January 25 in response to November 30 submission. Letter agreed that biodegradation of VCM was occurring and requested north and remainder of middle fence construction be started in 2010.
February 2010	An updated schedule was submitted to EPA on February 3. EPA approval of the updated schedule was received on February 23.
March 2010	Approval received March 11 from Nassau County Department of Public Works for discharge of well installation, development, and purge water to the Cedar Creek WPCP for a 3-year period. Repair of the Biosparge System air compressor was completed on March 25 and full operation resumed on March 29. USEPA requested on March 30 a work plan, including a QAPP, for a controlled study to evaluate the use of PDB/HydraSleeve™ samplers.
April 2010	A back-up compressor was purchased and installed as a contingency should shutdown of the main compressor occur.

TABLE 3.1

**CHRONOLOGY OF REMEDIAL ACTION IMPLEMENTATION ACTIVITIES  
OPERABLE UNIT-3 (OFF-SITE GROUNDWATER)  
HOOKER/RUCO SITE, HICKSONVILLE, NEW YORK**

<i>Date</i>	<i>Description</i>
May 2010	Performance monitoring of the Pilot System and of the VCM sub-plume was performed from May 3 to 25.
June 2010	Electronic and hard copy of base map submitted to EPA on June 23. Request for Bid for biosparge system wells distributed June 25. Access request for wells on Blackman Plumbing property submitted June 25.
July 2010	A workplan and QAPP Addendum for the evaluation of LFP vs. PDB samples were submitted on July 9. Bids for well installation were received July 12.
August 2010	Contract for well installation awarded to Boart Longyear on August 3. Application to relocate well to be located on Blackman Plumbing property to Town of Oyster Bay property submitted August 4.
September 2010	Boart Longyear mobilized to the Site on September 20 for the borehole drilling and well installation for the remainder of the Biosparge System. Injunction received September 30 restraining drilling activities in the vicinity of Blackman Plumbing properties. Biosparge system air compressor shut-down the 4th week of September for installation of wells for remainder of biosparge system.
October 2010	Request for Bids for the remaining components of the Biosparging Systems were distributed on October 14. Meeting held October 21 with Blackman Plumbing representatives to discuss possible well locations in the vicinity of Blackman Plumbing properties on Town of Oyster Bay property. Permission received October 22 from Town of Oyster Bay for alternate locations. EPA comments were received October 25 on the work plan/QAPP Addendum. A final QAPP Addendum was submitted on October 26. A request was made to Northrop on October 28 to install an additional well approximately 100 feet east of the IW-22.
November 2010	Bids for remaining components of the Biosparge System were received November 4. Performance monitoring of 12 of the 15 Pilot System groundwater monitoring wells was performed by LFP method from November 15 to 24. Four wells were sampled with PDBs. The PDB samplers were installed on November 15 and retrieved on November 29. Only one PDB sampler could be successfully retrieved.
December 2010	WHM Plumbing awarded on December 6 installation of the remaining components of the Biosparge System subject to satisfactorily complying with GSHI health and safety requirements.
January 2011	Performance monitoring of the remaining three Pilot System wells by LFP method was performed on January 20.
February 2011	All bidders were disqualified on February 18 due to inability to comply with GSHI health and safety requirements.
March 2011	Northrop denied on March 16 access to install an additional well approximately 100 feet east of IW-22. EPA approval of the GROWS Landfill in Morrisville, PA for the disposal of drill cuttings was received on March 17. Modified QAPP Addendum submitted to EPA on March 21. EPA approval of the modified QAPP Addendum received March 21. EPA approval of the Cycle Chem facility in Elizabeth, NJ for use as a transfer facility was received on March 23. Approximately 15,000 gallons of well installation and development water was discharged to the Cedar Creek WPCP on March 7 and 12. One roll-off of drill cuttings was shipped off-Site on March 23. Biosparge system compressor restarted the 4th week of March.

TABLE 3.1

**CHRONOLOGY OF REMEDIAL ACTION IMPLEMENTATION ACTIVITIES  
OPERABLE UNIT-3 (OFF-SITE GROUNDWATER)  
HOOKER/RUCO SITE, HICKSONVILLE, NEW YORK**

<i>Date</i>	<i>Description</i>
April 2011	Performance monitoring of the Pilot System and background sampling of the remainder of the Biosparge System was performed from April 5 to 28. Approximately 15,000 gallons of well installation and development water was discharged to the Cedar Creek WPCP on April 5.
May 2011	Bid documents for the remaining components of the Biosparge System were distributed to three new bidders on May 4. Well installation and development was completed on May 14. Approximately 10,000 gallons of well installation and development water was discharged to the Cedar Creek WPCP on May 14. Boart Longyear have completed the well installations and demobilized from the Site on May 15. Two roll-offs of drill cuttings were shipped off Site on May 20.
June 2011	Two roll-offs of drill cuttings were shipped off Site on June 7. Bids for the remaining Biosparge System components were received on June 17. Update of the Biosparge System provided at June 17 TAC meeting.
August 2011	CRA was given the opportunity to bid on the remaining components of the biosparge system on August 19. Evaluation comparing LFP to PDB/HydraSleeve sample results submitted to EPA August 31.
September 2011	EPA concurrence received September 22 allowing the use of PDB/HydraSleeve samplers for future groundwater sampling events. Updated QAPP requested September 22 by EPA
October 2011	Updated QAPP submitted on October 24. CRA Contractors was awarded on October 28 the contract for the installation of the remaining components of the Biosparge System.
November 2011	Performance monitoring of the Pilot System was performed using PDB/HydraSleeve samplers. Samplers were installed between November 9 and 11 and were retrieved between November 30 and December 1.
December 2011	An updated base map of the Site was submitted to the EPA on December 2. EPA comments were received on December 6 on the updated QAPP.
January 2012	A revised QAPP and responses to comments were submitted to the EPA on January 3. Notifications of the start of construction of the remainder of the biosparge system was submitted to the EPA on January 27.
February 2012	Pre-construction meeting held on February 9.
March 2012	Biosparge system compressors shut down and locked out on March 2 to allow for construction of the remaining components of the biosparging system. Contractor mobilized to the Site on March 5.
April 2012	A revised QAPP was submitted to the EPA on April 13.
May 2012	Performance monitoring of the Pilot System was performed. Samplers were installed on May 9 and retrieved on May 24 and 25.
June 2012	NYSDEC approval received June 19 to place excess soil on the Bayer property
July 2012	Construction of the remaining components of the biosparge system is complete. Startup/shakedown of the system is started Pre-Final Inspection performed on July 27.

TABLE 3.1

**CHRONOLOGY OF REMEDIAL ACTION IMPLEMENTATION ACTIVITIES  
OPERABLE UNIT-3 (OFF-SITE GROUNDWATER)  
HOOKER/RUCO SITE, HICKSONVILLE, NEW YORK**

<i>Date</i>	<i>Description</i>
August 2012	Draft Remedial Action Report submitted to EPA August 9, Civil and Mechanical As-Built Drawings submitted to EPA August 29.
September 2012	Final Inspection performed on September 12. Full time operation started September 17.

TABLE 3.2  
SUMMARY OF VCM, PCE, AND TCE CONCENTRATIONS  
HYDROPUNCH/ISOFLOW GROUNDWATER SAMPLES  
BIOSPARGE SYSTEM  
HICKSVILLE, NEW YORK

A) Upgradient of North Fence

Well (West to East)	MW-92					MW-93				
Sample Depth (ft bgs)	152	202	252	302	352	152	202	252	302	352
Parameter (µg/L)										
Tetrachloroethylene	ND	ND	11	940	640	ND	41	63	1700	2600
Trichloroethylene	ND	1.1	1.2	13	8.6	ND	11	65	35	33
Vinyl Chloride	6.5	14	ND	ND	ND	ND	41	ND	ND	ND

B) North Fence

Well (West to East)	IW-1						IW-2						MW-75						IW-3					
Sample Depth (ft bgs)	152	172	202	262	302	352	153	173	203	263	303	353	152	172	202	252	302	352	154	172	202	252	302	352
Parameter (µg/L)																								
Tetrachloroethylene	93	15	ND	4	7	ND	46	27	4	2	10	83	ND	2	ND	16	1	ND	ND	8	15	830	130	30
Trichloroethylene	71	6	ND	42	80	ND	28	17	3	15	57	220	ND	ND	ND	ND	2	ND	ND	5	3	10	41	46
Vinyl Chloride	70	ND	ND	ND	ND	ND	150	93	54	ND	ND	ND	2	39	ND	ND	ND	ND	72	760	12	ND	ND	ND

Well (West to East)	MW-70					MW-72				MW-76					IW-4				
Sample Depth (ft bgs)	162	202	252	302	352	202	252	302	352	142	202	262	302	352	162	202	252	302	352
Parameter (µg/L)																			
Tetrachloroethylene	ND	15	43	3	28	3	180	38	90	ND	14	95	81	2	ND	14	32	13	53
Trichloroethylene	ND	3	25	ND	16	ND	3	39	110	ND	3	83	130	8	ND	ND	11	9	3
Vinyl Chloride	47	60	1100	6	ND	5	ND	ND	ND	270	66	2100	ND	ND	120	32	810	ND	ND

Well (West to East)	IW-5						MW-90 <sup>(1)</sup>				IW-6				MW-73				
Sample Depth (ft bgs)	152	172	202	252	302	352	250	300	350	400	202	252	302	352	162	202	252	302	352
Parameter (µg/L)																			
Tetrachloroethylene	ND	ND	3	11	5300	76	18	ND	14	150	19	3.3	3200	500	ND	ND	ND	3400	57
Trichloroethylene	ND	ND	ND	10	27	ND	16	ND	13	1400	1.4	ND	31	180	ND	ND	ND	31	150
Vinyl Chloride	ND	ND	42	630	ND	ND	390	ND	ND	ND	39	370	ND	ND	ND	ND	8	ND	ND

Well (West to East)	MW-77				IW-7					
Sample Depth (ft bgs)	202	252	302	352	152	172	202	252	302	352
Parameter (µg/L)										
Tetrachloroethylene	ND	ND	20	100	2	130	4	7	1400	91
Trichloroethylene	ND	ND	19	290	ND	ND	ND	1	55	46
Vinyl Chloride	ND	16	380	ND	1	ND	ND	44	ND	ND

C) Middle Fence

Well (West to East)	MW-86						IW-15				MW-87 <sup>(1)</sup>				IW-16 <sup>(1)</sup>			
Sample Depth (ft bgs)	200	253	310	350	400	450	300	350	400	450	300	350	400	450	300	350	400	450
Parameter (µg/L)																		
Tetrachloroethylene	ND	ND	34	35	4	ND	5.2	21	ND	ND	130	43	38	29	ND	ND	79	ND
Trichloroethylene	ND	1.1	510	450	7	1	73	220	ND	ND	750	160	230	86	ND	ND	320	ND
Vinyl Chloride	21	ND	ND	ND	ND	ND	ND	ND	3.1	ND	670	270	92	ND	27	140	2900	ND

Well (West to East)	MW-81 <sup>(1)</sup>				IW-17 <sup>(1)</sup>				IW-18 <sup>(1)</sup>				IW-19 <sup>(1)</sup>			
Sample Depth (ft bgs)	300	350	400	450	300	350	400	450	300	350	400	450	300	350	400	450
Parameter (µg/L)																
Tetrachloroethylene	ND	130	96	56	80	140	ND	80	ND	190	87	260	ND	54	230	50
Trichloroethylene	ND	180	410	280	750	140	8	390	ND	930	470	1100	ND	43	1200	170
Vinyl Chloride	150	2900	650	ND	540	9000	39	8.4	59	1100	55	ND	ND	2000	4300	ND

Well (West to East)	MW-82 <sup>(1)</sup>					MW-88 <sup>(1)</sup>				IW-20				IW-21			
Sample Depth (ft bgs)	300	350	400	450	500	300	350	400	450	300	350	400	450	300	350	400	450
Parameter (µg/L)																	
Tetrachloroethylene	5.5	ND	160	230	ND	62	73	190	280	ND	23	280	ND	6.8	20	18	2
Trichloroethylene	ND	ND	320	810	ND	13	38	510	910	ND	16	200	ND	3.3	21	11	3
Vinyl Chloride	ND	19	1900	47	ND	42	610	1800	5.3	ND	46	550	ND	2	170	140	ND

Well (West to East)	MW-89				IW-22			
Sample Depth (ft bgs)	300	350	400	450	300	350	400	450
Parameter (µg/L)								
Tetrachloroethylene	9	32	63	9.3	67	19	43	ND
Trichloroethylene	26	48	25	12	17	6.4	19	ND
Vinyl Chloride	19	50	7	ND	22	10	3.5	ND

Note:

(1) 2005/2006 Pilot System Installation Results

TABLE 3.3

**WELL INSTALLATION DETAILS  
OPERABLE UNIT-3 BIOSPACE SYSTEM  
HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Well Designation</i>	<i>Date Completed</i>	<i>Ground Surface (ft amsl)</i>	<i>Measuring Point Elevation <sup>(1)</sup> (ft amsl)</i>	<i>Top of Sandpack</i>		<i>Top of Screen</i>		<i>Bottom of Screen</i>		<i>Bottom of Sandpack</i>		<i>Well Diameter (in)</i>	<i>Well Screen Slot Size</i>	<i>Well Material</i>
				<i>(ft bgs)</i>	<i>(ft amsl)</i>	<i>(ft bgs)</i>	<i>(ft amsl)</i>	<i>(ft bgs)</i>	<i>(ft amsl)</i>	<i>(ft bgs)</i>	<i>(ft amsl)</i>			
IW-1D1A	04/28/11	121.93	NA	185.0	-63.1	190.0	-68.1	195.0	-73.1	200.0	-78.1	1.25	10	BI/SS
IW-1D1L	04/28/11	121.93	NA	215.0	-93.1	220.0	-98.1	230.0	-108.1	235.0	-113.1	1.25	10	Sch. 80 PVC
IW-1D2A	04/28/11	121.93	NA	255.0	-133.1	260.0	-138.1	265.0	-143.1	270.0	-148.1	1.25	10	BI/SS
IW-2D1A	04/8/11	122.72	NA	195.0	-72.3	200.0	-77.3	205.0	-82.3	210.0	-87.3	1.25	10	BI/SS
IW-2D1L	04/8/11	122.72	NA	220.0	-97.3	225.0	-102.3	235.0	-112.3	240.0	-117.3	1.25	10	Sch. 80 PVC
IW-2D2A	04/8/11	122.72	NA	255.0	-132.3	260.0	-137.3	265.0	-142.3	270.0	-147.3	1.25	10	BI/SS
IW-3D1A	03/25/11	121.73	NA	195.0	-73.3	200.0	-78.3	205.0	-83.3	210.0	-88.3	1.25	10	BI/SS
IW-3D1L	03/25/11	121.73	NA	215.0	-93.3	225.0	-103.3	235.0	-113.3	240.0	-118.3	1.25	10	Sch. 80 PVC
IW-3D2A	03/25/11	121.73	NA	255.0	-133.3	260.0	-138.3	265.0	-143.3	270.0	-148.3	1.25	10	BI/SS
IW-4D1A	01/27/11	121.76	NA	220.0	-98.2	225.0	-103.2	230.0	-108.2	235.0	-113.2	1.25	10	BI/SS
IW-4D1L	01/27/11	121.76	NA	240.0	-118.2	245.0	-123.2	255.0	-133.2	260.0	-138.2	1.25	10	Sch. 80 PVC
IW-4D2A	01/27/11	121.76	NA	270.0	-148.2	275.0	-153.2	280.0	-158.2	285.0	-163.2	1.25	10	BI/SS
IW-5D1A	04/12/11	122.22	NA	210.0	-87.8	215.0	-92.8	220.0	-97.8	225.0	-102.8	1.25	10	BI/SS
IW-5D1L	04/12/11	122.22	NA	255.0	-132.8	260.0	-137.8	270.0	-147.8	275.0	-152.8	1.25	10	Sch. 80 PVC
IW-5D2A	04/12/11	122.22	NA	295.0	-172.8	300.0	-177.8	305.0	-182.8	310.0	-187.8	1.25	10	BI/SS
IW-6D1A	01/17/11	123.75	NA	250.0	-126.3	255.0	-131.3	260.0	-136.3	265.0	-141.3	1.25	10	BI/SS
IW-6D1L	01/17/11	123.75	NA	270.0	-146.3	275.0	-151.3	285.0	-161.3	290.0	-166.3	1.25	10	Sch. 80 PVC
IW-6D2A	01/17/11	123.75	NA	295.0	-171.3	300.0	-176.3	305.0	-181.3	310.0	-186.3	1.25	10	BI/SS
IW-7D1A	03/29/11	125.78	NA	260.0	-134.2	265.0	-139.2	270.0	-144.2	290.0	-164.2	1.25	10	BI/SS
IW-7D1L	03/29/11	125.78	NA	260.0	-134.2	275.0	-149.2	285.0	-159.2	290.0	-164.2	1.25	10	Sch. 80 PVC
IW-7D2A	03/29/11	125.78	NA	295.0	-169.2	300.0	-174.2	305.0	-179.2	310.0	-184.2	1.25	10	BI/SS
IW-15D1A	10/05/10	119.95	NA	348.0	-228.1	355.0	-235.1	360.0	-240.1	361.0	-241.1	1.25	10	BI/SS
IW-15D1L	10/05/10	119.95	NA	366.0	-246.1	368.0	-248.1	378.0	-258.1	379.0	-259.1	1.25	10	BI/SS
IW-15D2A	10/05/10	119.95	NA	401.0	-281.1	406.0	-286.1	411.0	-291.1	416.0	-296.1	1.25	10	BI/SS
IW-16D1A	11/01/05	121.6	NA	380.0	-258.4	395.0	-273.4	400.0	-278.4	401.0	-279.4	1.0	10	BI/SS
IW-16D1L	11/01/05	121.6	NA	380.0	-258.4	385.0	-263.4	400.0	-278.4	401.0	-279.4	1.0	10	Sch. 80 PVC
IW-16D2A	11/01/05	121.6	NA	420.0	-298.4	425.0	-303.4	430.0	-308.4	435.0	-313.4	1.0	10	BI/SS
IW-17D1A	12/01/05	121.8	NA	330.0	-208.2	345.0	-223.2	350.0	-228.2	355.0	-233.2	1.0	10	BI/SS
IW-17D1L	12/01/05	121.8	NA	330.0	-208.2	335.0	-213.2	350.0	-228.2	355.0	-233.2	1.0	10	Sch. 80 PVC
IW-17D2A	12/01/05	121.8	NA	415.0	-293.2	420.0	-298.2	425.0	-303.2	429.5	-307.7	1.0	10	BI/SS
IW-18D1A	01/09/06	121.5	NA	344.75	-223.3	359.83	-238.3	364.83	-243.3	367.0	-245.5	1.0	10	BI/SS
IW-18D1L	01/09/06	121.5	NA	344.75	-223.3	349.83	-228.3	364.83	-243.3	367.0	-245.5	1.0	10	Sch. 80 PVC
IW-18D2A	01/09/06	121.5	NA	412.0	-290.5	420.0	-298.5	425.0	-303.5	430.0	-308.5	1.0	10	BI/SS
IW-19D1A	01/13/06	121.1	NA	337.0	-215.9	355.0	-233.9	360.0	-238.9	360.5	-239.4	1.0	10	BI/SS
IW-19D1L	01/13/06	121.1	NA	337.0	-215.9	345.0	-223.9	360.0	-238.9	360.5	-239.4	1.0	10	Sch. 80 PVC

TABLE 3.3

**WELL INSTALLATION DETAILS  
OPERABLE UNIT-3 BIOSPACE SYSTEM  
HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Well Designation</i>	<i>Date Completed</i>	<i>Ground Surface (ft amsl)</i>	<i>Measuring Point Elevation <sup>(1)</sup> (ft amsl)</i>	<i>Top of Sandpack (ft bgs) (ft amsl)</i>		<i>Top of Screen (ft bgs) (ft amsl)</i>		<i>Bottom of Screen (ft bgs) (ft amsl)</i>		<i>Bottom of Sandpack (ft bgs) (ft amsl)</i>		<i>Well Diameter (in)</i>	<i>Well Screen Slot Size</i>	<i>Well Material</i>
IW-19D2A	01/13/06	121.1	NA	415.0	-293.9	420.0	-298.9	425.0	-303.9	430.0	-308.9	1.0	10	BI/SS
IW-20D1A	10/13/10	119.75	NA	362.0	-242.3	367.0	-247.3	372.0	-252.3	377.0	-257.3	1.25	10	BI/SS
IW-20D1L	10/13/10	119.75	NA	385.0	-265.3	390.0	-270.3	400.0	-280.3	402.0	-282.3	1.25	10	Sch. 80 PVC
IW-20D2A	10/13/10	119.75	NA	425.0	-305.3	430.0	-310.3	435.0	-315.3	440.0	-320.3	1.25	10	BI/SS
IW-21D1A	10/23/10	119.83	NA	370.0	-250.2	375.0	-255.2	380.0	-260.2	385.0	-265.2	1.25	10	BI/SS
IW-21D1L	10/23/10	119.83	NA	395.0	-275.2	400.0	-280.2	410.0	-290.2	411.0	-291.2	1.25	10	Sch. 80 PVC
IW-21D2A	10/23/10	119.83	NA	430.0	-310.2	435.0	-315.2	440.0	-320.2	445.0	-325.2	1.25	10	BI/SS
IW-22D1A	11/03/10	121.01	NA	350.0	-229.0	355.0	-234.0	360.0	-239.0	365.0	-244.0	1.25	10	BI/SS
IW-22D1L	11/03/10	121.01	NA	380.0	-259.0	385.0	-264.0	395.0	-274.0	396.0	-275.0	1.25	10	Sch. 80 PVC
IW-22D2A	11/03/10	121.01	NA	415.0	-294.0	420.0	-299.0	425.0	-304.0	430.0	-309.0	1.25	10	BI/SS
MW-50D1 <sup>(2)</sup>	02/23/95	130.6	132.63	279	-148.4	285	-154.4	305	-174.4	305	-174.4	2	10	Sch. 80 PVC
MW-50D2 <sup>(2)</sup>	02/13/95	130.0	132.03	405	-275.0	415	-285.0	435	-305.0	435	-305.0	2	10	Sch. 80 PVC
MW-51D1	10/24/95	129.2	131.85	224	-94.8	235	-105.8	255	-125.8	260	-130.8	2	10	Sch. 80 PVC
MW-51D2	10/02/95	128.8	130.38	342	-213.2	350	-221.2	365	-236.2	370	-241.2	2	10	Sch. 80 PVC
MW-52S <sup>(2)</sup>	01/17/96	125.8	125.48	119.4	6.4	125	0.8	140	-14.2	142	-16.2	2	10	Sch. 80 PVC
MW-52I <sup>(2)</sup>	12/14/95	125.6	125.30	213.7	-88.1	220	-94.4	235	-109.4	237	-111.4	2	10	Sch. 80 PVC
MW-52D <sup>(2)</sup>	12/12/95	126.1	125.88	366.2	-240.1	371	-244.9	386	-259.9	387	-260.9	2	10	Sch. 80 PVC
MW-53I	06/08/95	120.7	120.73	145	-24.3	150	-29.3	170	-49.3	173	-52.3	2	10	Sch. 80 PVC
MW-53D1	06/19/95	120.8	120.80	294	-173.2	300	-179.2	330	-209.2	335	-214.2	2	10	Sch. 80 PVC
MW-53D2	06/05/95	120.7	120.66	415	-294.3	430	-309.3	460	-339.3	460	-339.3	2	10	Sch. 80 PVC
MW-56S <sup>(2)</sup>	01/26/96	133.9	133.60	98.5	35.4	105	28.9	120	13.9	123	10.9	2	10	Sch. 80 PVC
MW-56I <sup>(2)</sup>	01/25/96	133.9	133.47	253.5	-119.6	260	-126.1	275	-141.1	280	-146.1	2	10	Sch. 80 PVC
MW-57S	01/23/96	127.9	127.68	131.7	-3.8	137	-9.1	152	-24.1	155.5	-27.6	2	10	Sch. 80 PVC
MW-57I	01/25/96	128.0	127.48	184.5	-56.5	191	-63.0	206	-78.0	208	-80.0	2	10	Sch. 80 PVC
MW-58D	03/26/02	116.22	115.99	395	-278.8	400	-283.8	410	-293.8	415	-298.8	2	10	BI/SS
MW-58D1	03/26/02	116.22	115.99	460	-343.8	465	-348.8	475	-358.8	480	-363.8	2	10	BI/SS
MW-58D2	03/26/02	116.22	115.99	495	-378.8	500	-383.8	510	-393.8	515	-398.8	2	10	BI/SS
MW-59D	04/06/02	117.37	117.13	395	-277.6	400	-282.6	410	-292.6	415	-297.6	2	10	BI/SS
MW-59D1	04/06/02	117.37	117.13	460	-342.6	465	-347.6	475	-357.6	480	-362.6	2	10	BI/SS
MW-59D2	04/06/02	117.37	117.13	495	-377.6	500	-382.6	510	-392.6	515	-397.6	2	10	BI/SS
MW-60D1	03/05/02	119.02	118.70	325	-206.0	330	-211.0	340	-221.0	345	-226.0	2	10	BI/SS
MW-60S	03/08/02	118.96	118.93	175	-56.0	180	-61.0	190	-71.0	195	-76.0	2	10	BI/SS
MW-60I	03/08/02	118.96	118.93	225	-106.0	230	-111.0	240	-121.0	245	-126.0	2	10	BI/SS
MW-60D	03/08/02	118.96	118.93	275	-156.0	280	-161.0	290	-171.0	295	-176.0	2	10	BI/SS
MW-61S	02/22/02	121.19	120.91	165	-43.8	170	-48.8	180	-58.8	185	-63.8	2	10	BI/SS

TABLE 3.3

**WELL INSTALLATION DETAILS  
OPERABLE UNIT-3 BIOSPACE SYSTEM  
HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Well Designation</i>	<i>Date Completed</i>	<i>Ground Surface (ft amsl)</i>	<i>Measuring Point Elevation <sup>(1)</sup> (ft amsl)</i>	<i>Top of Sandpack (ft bgs) (ft amsl)</i>		<i>Top of Screen (ft bgs) (ft amsl)</i>		<i>Bottom of Screen (ft bgs) (ft amsl)</i>		<i>Bottom of Sandpack (ft bgs) (ft amsl)</i>		<i>Well Diameter (in)</i>	<i>Well Screen Slot Size</i>	<i>Well Material</i>
MW-61I	02/22/02	121.19	120.91	200	-78.8	205	-83.8	215	-93.8	220	-98.8	2	10	BI/SS
MW-61D1	02/22/02	121.19	120.91	265	-143.8	270	-148.8	280	-158.8	285	-163.8	2	10	BI/SS
MW-61D2	03/12/02	121.15	121.05	360	-238.9	365	-243.9	375	-253.9	380	-258.9	2	10	BI/SS
MW-62I	05/14/02	128.27	128.15	255	-126.7	260	-131.7	270	-141.7	275	-146.7	2	10	Sch. 80 PVC
MW-62D	04/20/02	128.03	127.82	325	-197.0	330	-202.0	340	-212.0	345	-217.0	2	10	BI/SS
MW-63S	02/18/02	118.67	118.45	175	-56.3	180	-61.3	190	-71.3	195	-76.3	2	10	Sch. 80 PVC
MW-63I	02/18/02	118.67	118.45	210	-91.3	215	-96.3	225	-106.3	230	-111.3	2	10	Sch. 80 PVC
MW-63D1	02/18/02	118.67	118.45	245	-126.3	250	-131.3	260	-141.3	265	-146.3	2	10	Sch. 80 PVC
MW-63D2	02/18/02	118.67	118.45	280	-161.3	285	-166.3	295	-176.3	300	-181.3	2	10	Sch. 80 PVC
MW-64S	02/09/02	125.66	125.59	175	-49.3	180	-54.3	190	-64.3	200	-74.3	2	10	Sch. 80 PVC
MW-64I	02/09/02	125.66	125.59	245	-119.3	250	-124.3	260	-134.3	265	-139.3	2	10	Sch. 80 PVC
MW-64D	02/09/02	125.66	125.59	285	-159.3	290	-164.3	300	-174.3	305	-179.3	2	10	Sch. 80 PVC
MW-66D2 <sup>(2)</sup>	06/08/02	118.60	118.15	450	-331.4	455	-336.4	465	-346.4	475	-356.4	2	10	BI/SS
MW-66I <sup>(2)</sup>	06/19/02	118.27	118.20	290	-171.7	295	-176.7	305	-186.7	310	-191.7	2	10	BI/SS
MW-66D1 <sup>(2)</sup>	06/19/02	118.27	118.20	350	-231.7	355	-236.7	365	-246.7	320	-201.7	2	10	BI/SS
MW-67S	01/11/03	118.68	118.37	440.0	-321.3	445.0	-326.3	455.0	-336.3	460.0	-341.3	2	10	BI/SS
MW-67D	01/11/03	118.68	118.33	490.0	-371.3	495.0	-376.3	505.0	-386.3	510.0	-391.3	2	10	BI/SS
MW-68S	02/09/03	119.20	118.97	455.0	-335.8	457.0	-337.8	467.0	-347.8	470.0	-350.8	2	10	BI/SS
MW-68D	02/09/03	119.20	119.00	485.0	-365.8	490.0	-370.8	500.0	-380.8	505.0	-385.8	2	10	BI/SS
MW-70D1	02/02/11	120.27	119.53	191.0	-70.7	196.0	-75.7	206.0	-85.7	211.0	-90.7	2	10	BI/SS
MW-70D2	02/02/11	120.27	119.14	241.0	-120.7	246.0	-125.7	256.0	-135.7	257.0	-136.7	2	10	BI/SS
MW-72D1	03/16/11	119.66	118.23	195.0	-75.3	200.0	-80.3	210.0	-90.3	215.0	-95.3	2	10	BI/SS
MW-72D2	03/16/11	119.66	118.52	255.0	-135.3	260.0	-140.3	270.0	-150.3	271.0	-151.3	2	10	BI/SS
MW-73D1	02/11/11	121.44	119.66	215.0	-93.6	220.0	-98.6	230.0	-108.6	235.0	-113.6	2	10	BI/SS
MW-73D2	02/11/11	121.44	120.10	255.0	-133.6	260.0	-138.6	270.0	-148.6	271.0	-149.6	2	10	BI/SS
MW-75D1	05/02/11	118.85	117.85	155.0	-36.2	160.0	-41.2	170.0	-51.2	175.0	-56.2	2	10	BI/SS
MW-75D2	05/02/11	119.04	118.21	220.0	-101.0	225.0	-106.0	235.0	-116.0	236.0	-117.0	2	10	BI/SS
MW-76S	03/03/11	120.21	119.05	75.0	45.2	80.0	40.2	90.0	30.2	95.0	25.2	2	10	BI/SS
MW-76I	03/03/11	120.21	118.97	120.0	0.2	125.0	-4.8	135.0	-14.8	136.0	-15.8	2	10	BI/SS
MW-76D1	02/15/11	119.51	118.80	190.0	-70.5	195.0	-75.5	205.0	-85.5	210.0	-90.5	2	10	BI/SS
MW-76D2	02/15/11	119.51	118.86	260.0	-140.5	265.0	-145.5	275.0	-155.5	276.0	-156.5	2	10	BI/SS
MW-77D1	02/26/11	122.47	121.23	240.0	-117.5	245.0	-122.5	255.0	-132.5	260.0	-137.5	2	10	BI/SS
MW-77D2	02/26/11	122.47	121.72	290.0	-167.5	295.0	-172.5	305.0	-182.5	306.0	-183.5	2	10	Sch. 80 PVC
MW-81D1	11/01/05	121.60	121.07	300.0	-178.40	305.0	-183.4	315.0	-193.4	319.0	-197.4	2	10	Sch. 80 PVC
MW-81D2	11/01/05	121.60	121.05	397.0	-275.40	405.0	-283.4	415.0	-293.4	416.0	-294.4	2	10	Sch. 80 PVC



TABLE 3.3

**WELL INSTALLATION DETAILS  
OPERABLE UNIT-3 BIOSPACE SYSTEM  
HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Well Designation</i>	<i>Date Completed</i>	<i>Ground Surface (ft amsl)</i>	<i>Measuring Point Elevation <sup>(1)</sup> (ft amsl)</i>	<i>Top of Sandpack (ft bgs) (ft amsl)</i>		<i>Top of Screen (ft bgs) (ft amsl)</i>		<i>Bottom of Screen (ft bgs) (ft amsl)</i>		<i>Bottom of Sandpack (ft bgs) (ft amsl)</i>		<i>Well Diameter (in)</i>	<i>Well Screen Slot Size</i>	<i>Well Material</i>
MW-82D1	02/15/06	120.50	120.14	337.0	-216.50	345.0	-224.5	355.0	-234.5	355.5	-235.0	2	10	Sch. 80 PVC
MW-82D2	02/15/06	120.50	120.15	404.8	-284.30	409.4	-288.9	419.4	-298.9	420.5	-300.0	2	10	BI/SS
MW-83D1	11/06/05	121.58	120.99	300.0	-178.42	305.0	-183.4	315.0	-193.4	321.0	-199.4	2	10	Sch. 80 PVC
MW-83D2	11/06/05	121.58	121.02	385.0	-263.42	390.0	-268.4	400.0	-278.4	401.0	-279.4	2	10	Sch. 80 PVC
MW-84D1	04/12/06	121.34	120.90	335.6	-214.26	345.0	-223.7	355.0	-233.7	358.0	-236.7	2	10	Sch. 80 PVC
MW-84D2	04/12/06	121.34	120.94	382.6	-261.26	390.6	-269.3	400.6	-279.3	405.0	-283.7	2	10	BI/SS
MW-85S	12/04/10	119.30	118.20	213.0	-93.70	218.0	-98.7	228.0	-108.7	233.0	-113.7	2	10	BI/SS
MW-85I	12/04/10	119.30	118.28	273.0	-153.7	277.0	-157.7	287.0	-167.7	287.0	-167.7	2	10	BI/SS
MW-85D1	12/02/10	119.30	118.20	335.0	-215.7	340.0	-220.7	350.0	-230.7	355.0	-235.7	2	10	BI/SS
MW-85D2	12/02/10	119.30	118.47	390.0	-270.7	395.0	-275.7	405.0	-285.7	407.0	-287.7	2	10	BI/SS
MW-86D1	11/11/10	118.96	117.77	195.0	-76.0	200.0	-81.0	210.0	-91.0	215.0	-96.0	2	10	BI/SS
MW-86D2	11/11/10	118.96	117.84	345.0	-226.0	350.0	-231.0	360.0	-241.0	365.0	-246.0	2	10	BI/SS
MW-87D1	10/04/05	121.05	120.55	299.0	-177.95	307.0	-186.0	317.0	-196.0	319.0	-198.0	2	10	Sch. 80 PVC
MW-87D2	10/04/05	121.05	120.55	400.0	-278.95	405.0	-284.0	415.0	-294.0	416.0	-295.0	2	10	Sch. 80 PVC
MW-88D1	03/21/06	120.89	120.17	297.7	-176.81	305.0	-184.1	315.0	-194.1	320.4	-199.5	2	10	Sch. 80 PVC
MW-88D2	03/21/06	120.89	120.05	398.5	-277.61	405.6	-284.7	415.6	-294.7	416.0	-295.1	2	10	BI/SS
MW-89D1	12/19/10	119.30	117.97	340.0	-220.7	345.0	-225.7	355.0	-235.7	360.0	-240.7	2	10	BI/SS
MW-89D2	12/19/10	119.30	118.19	375.0	-255.7	380.0	-260.7	390.0	-270.7	391.0	-271.7	2	10	BI/SS
MW-90D1	03/28/06	123.31	122.93	222.0	-98.69	238.0	-114.7	243.0	-119.7	245.0	-121.7	1.5	10	BI/SS
MW-90D2	03/28/06	123.29	122.85	262.0	-138.71	267.0	-143.7	272.0	-148.7	280.0	-156.7	1.5	10	BI/SS
MW-92D1	03/11/11	123.65	121.28	205.0	-81.4	210.0	-86.4	220.0	-96.4	225.0	-101.4	2	10	BI/SS
MW-92D2	03/11/11	122.21	121.50	250.0	-127.8	255.0	-132.8	265.0	-142.8	266.0	-143.8	2	10	BI/SS
MW-93D1	03/03/11	123.65	122.93	200.0	-76.4	205.0	-81.4	215.0	-91.4	220.0	-96.4	2	10	BI/SS
MW-93D2	03/03/11	123.65	122.46	255.0	-131.4	260.0	-136.4	270.0	-146.4	271.0	-147.4	2	10	BI/SS
VZ-1S	03/15/11	119.66	118.16	4.0	115.66	6.0	113.7	8.0	111.7	9.0	110.7	1.0	10	Sch. 40 PVC
VZ-1D	03/15/11	119.66	118.06	39.0	80.66	41.0	78.7	46.0	73.7	47.0	72.7	1.0	10	Sch. 40 PVC
VZ-2S	02/12/11	121.44	120.17	4.0	117.44	6.0	115.4	8.0	113.4	8.5	112.9	1.0	10	Sch. 40 PVC
VZ-2D	02/12/11	121.44	120.21	42.0	79.44	44.0	77.4	49.0	72.4	57.0	64.4	1.0	10	Sch. 40 PVC
VZ-4S	04/30/11	118.85	117.84	4.0	114.85	6.0	112.9	8.0	110.9	9.0	109.9	1.0	10	Sch. 40 PVC
VZ-4D	04/30/11	118.85	117.74	41.0	77.85	43.0	75.9	48.0	70.9	50.0	68.9	1.0	10	Sch. 40 PVC
VZ-5S	03/11/11	119.51	118.16	4.0	115.51	6.0	113.5	8.0	111.5	9.0	110.5	1.0	10	Sch. 40 PVC
VZ-5D	03/11/11	119.51	118.16	39.0	80.51	41.0	78.5	46.0	73.5	47.0	72.5	1.0	10	Sch. 40 PVC
VZ-6S	02/26/11	122.47	121.09	4.0	118.47	6.0	116.5	8.0	114.5	9.0	113.5	1.0	10	Sch. 40 PVC
VZ-6D	02/26/11	122.47	121.13	42.0	80.47	44.0	78.5	49.0	73.5	57.0	65.5	1.0	10	Sch. 40 PVC
VZ-10S	01/19/06	121.90	121.81	4.0	117.90	6.0	115.9	8.0	113.9	8.5	113.4	1.0	10	Sch. 40 PVC

TABLE 3.3

**WELL INSTALLATION DETAILS  
OPERABLE UNIT-3 BIOSPACE SYSTEM  
HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Well Designation</i>	<i>Date Completed</i>	<i>Ground Surface (ft amsl)</i>	<i>Measuring Point Elevation <sup>(1)</sup> (ft amsl)</i>	<i>Top of Sandpack (ft bgs) (ft amsl)</i>		<i>Top of Screen (ft bgs) (ft amsl)</i>		<i>Bottom of Screen (ft bgs) (ft amsl)</i>		<i>Bottom of Sandpack (ft bgs) (ft amsl)</i>		<i>Well Diameter (in)</i>	<i>Well Screen Slot Size</i>	<i>Well Material</i>
VZ-10D	01/19/06	121.90	121.81	49.0	72.90	51.0	70.9	56.0	65.9	60.0	61.9	1.0	10	Sch. 40 PVC
VZ-11S	02/28/06	121.35	120.64	4.0	117.35	6.0	115.4	8.0	113.4	8.5	112.9	1.0	10	Sch. 40 PVC
VZ-11D	02/28/06	121.35	120.60	42.0	79.35	44.0	77.4	49.0	72.4	63.0	58.4	1.0	10	Sch. 40 PVC
VZ-12S	12/05/10	119.30	117.98	4.0	115.3	6.0	113.3	8.0	111.3	8.5	110.8	1.0	10	Sch. 40 PVC
VZ-12D	12/05/10	119.30	118.09	41.5	77.8	43.5	75.8	48.5	70.8	49.0	70.3	1.0	10	Sch. 40 PVC
VZ-14S	10/07/05	121.32	120.97	4.0	117.32	6.0	115.3	8.0	113.3	8.5	112.8	1.0	10	Sch. 40 PVC
VZ-14D	10/07/05	121.32	121.01	47.0	74.32	49.0	72.3	54.0	67.3	69.0	52.3	1.0	10	Sch. 40 PVC
VZ-15S	11/04/05	121.46	121.31	4.0	117.46	6.0	115.5	8.0	113.5	12.5	109.0	1.0	10	Sch. 40 PVC
VZ-15D	11/04/05	121.46	121.32	49.0	72.46	51.0	70.5	56.0	65.5	63.0	58.5	1.0	10	Sch. 40 PVC
VZ-16S	01/23/06	120.42	120.13	4.0	116.42	6.0	114.4	8.0	112.4	8.5	111.9	1.0	10	Sch. 40 PVC
VZ-16D	01/23/06	120.42	120.27	49.0	71.42	51.0	69.4	56.0	64.4	60.0	60.4	1.0	10	Sch. 40 PVC
VZ-17S	12/20/10	119.30	117.98	4.0	115.3	6.0	113.3	8.0	111.3	8.5	110.8	1.0	10	Sch. 40 PVC
VZ-17D	12/20/10	119.30	118.01	31.0	88.3	33.0	86.3	38.0	81.3	50.0	69.3	1.0	10	Sch. 40 PVC

## Notes:

- (1) Measuring Point is generally top of well riser pipe. Measuring point is marked.
- (2) Abandoned
- amsl above mean sea level
- bgs below ground surface
- BI Black Steel Riser
- SS Stainless Steel Well Screen
- PVC Polyvinyl Chloride
- NA Not Applicable

TABLE 3.4

**VOLUME OF NORTHROP GP-1/GP-3 SYSTEM TREATED WATER INJECTED  
OPERABLE UNIT 3  
HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Start Date</i>	<i>End Date</i>	<i>Water (gal.)</i>
4/6/07	5/2/07	295,910
5/2/07	6/4/07	453,330
6/4/07	7/6/07	404,500
7/6/07	8/2/07	163,940
8/2/07	8/31/07	344,660
8/31/07	10/3/07	308,190
10/3/07	10/21/07	193,650
10/21/07	11/29/07	343,010
11/29/07	1/4/08	249,880
1/4/08	1/31/08	235,070
1/31/08	3/4/08	379,720
3/4/08	4/3/08	299,620
4/3/08	5/7/08	158,440
5/7/08	5/30/08	138,380
5/30/08	6/30/08	27,930
6/30/08	7/31/08	168,620
7/31/08	9/5/08	394,613
9/5/08	10/3/08	280,157
10/3/08	10/22/08	78,230
10/22/08	11/26/08	146,890
11/26/08	12/6/08	158,520
12/6/08	2/10/09	0
2/10/09	2/26/09	201,710
2/26/09	3/30/09	334,980
3/30/09	4/15/09	69,100
4/15/09	6/1/09	418,610
6/1/09	7/1/09	293,480
7/1/09	7/28/09	210,600
7/28/09	9/3/09	221,400
9/3/09	10/16/09	90,000
10/16/09	11/5/09	421,200
11/5/09	12/2/09	396,830
12/2/09	12/29/09	408,038
12/29/09	1/25/10	343,237
1/25/10	3/1/10	275,615
3/1/10	4/1/10	0
4/1/10	8/18/10	555,440
8/18/10	9/21/10	335,350
9/21/10	2/8/11	55,040
2/8/11	2/28/11	106,570
2/28/11	3/31/11	135,030
3/31/11	5/3/11	55,830
5/3/11	6/6/11	265,700
6/6/11	7/5/11	197,290

**TABLE 3.4**

**VOLUME OF NORTHROP GP-1/GP-3 SYSTEM TREATED WATER INJECTED  
OPERABLE UNIT 3  
HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Start Date</i>	<i>End Date</i>	<i>Water (gal.)</i>
7/5/11	8/11/11	4,190
8/11/11	8/31/11	190
8/31/11	10/1/11	0
10/1/11	10/31/11	0
10/31/11	11/30/11	0
11/30/11	1/3/12	154,270
1/3/12	2/6/12	307,320
2/6/12	3/1/12	215,250
3/1/12	4/3/12	0
4/3/12	8/31/12	0

**TABLE 7.1**  
**SUMMARY OF PERFORMANCE MONITORING <sup>(1)</sup>**  
**OU-3 BIOSPARGE REMEDY**  
**HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Pilot System</i>			
<i>Media</i>	<i>Location</i>	<i>Frequency</i>	<i>Parameters</i>
Groundwater	MW-61I/D1/D2 MW-82	- Background <sup>(2)</sup> - Monthly for First Quarter - Quarterly for remainder of first 2 years of operation	- VOCs + TICs <sup>(3)</sup> , TOC, N, P, DO, ORP, pH, Temperature, Conductivity, Fe <sup>+2</sup> - Heterotrophic microorganisms annually
	MW-83, MW-84	- Background <sup>(2)</sup> - Quarterly for first 2 years of operation	- VOCs + TICs <sup>(3)</sup> , TOC, N, P, DO, ORP, pH, Temperature, Conductivity, Fe <sup>+2</sup> - Heterotrophic microorganisms annually
	MW-81, MW-87, MW-88	- Background <sup>(2)</sup> - Quarterly for first year of operation - Semi-annual for second year	- VOCs + TICs <sup>(3)</sup> , TOC, N, P, DO, ORP, pH, Temperature, Conductivity, Fe <sup>+2</sup> - Heterotrophic microorganisms annually
	All Pilot System MW Wells	- - Semi-annual since October 2008	- VOCs, TOC, N, P, DO, ORP, pH, Temperature, Conductivity, Fe <sup>+2</sup>
Soil Gas (No Further Sampling of Pilot System VZ Wells)	VZ-10, VZ-11	- Background <sup>(2)</sup> - Shortly after initial Air Injection - Monthly for First Quarter - Quarterly for remainder of first 2 years of operation  - Thereafter Semi-Annually until November 2010	- Monitor with PID - If elevated PID reading collect sample for VOCs and methane  - VOCs and methane
	VZ-14, VZ-15, VZ-16	- Background <sup>(2)</sup> - Semi-Annually	- Monitor with PID - VOCs and methane
Ambient Air	(4)	- Semi-Annually	- If elevated PID reading collect sample for VOCs and methane
Liquid Supplements	Mixing Unit	- Prior to use once annually for a maximum of 3 times	- TOC, N, P

**TABLE 7.1**  
**SUMMARY OF PERFORMANCE MONITORING <sup>(1)</sup>**  
**OU-3 BIOSPARGE REMEDY**  
**HOOKER/RUCO SITE, HICKSVILLE, NEW YORK**

<i>Remainder of Biosparge System</i>			
<i>Media</i>	<i>Location</i>	<i>Frequency</i>	<i>Parameters</i>
Groundwater	MW-70, MW-72, MW-73, MW-75 MW-76, MW-77 MW-85, MW-86, MW-89, MW-90	- Background <sup>(5)</sup> - Quarterly for first 2 years of operation - Semi-Annual thereafter	- VOCs + TICs <sup>(3)</sup> , TOC, N, P, DO, ORP, pH, Temperature, Conductivity, Fe <sup>+2</sup> - Heterotrophic microorganisms <sup>(6)</sup>
Soil Gas	VZ-1, VZ-2 VZ-4, VZ-5 VZ-6, VZ-12 VZ-17	- Background <sup>(5)</sup> - Quarterly for first year of operation  - Semi-Annually for second year of operation	- Monitor with PID - If elevated PID reading, collect sample for VOCs and methane  - VOCs and methane
Ambient Air	(4)	- Semi-Annually	- If elevated PID reading collect sample for VOCs and methane
Liquid Supplements	Included in Phase I		

Notes:

- <sup>(1)</sup> Scope of monitoring to be evaluated after receipt of first 3 years of monitoring results for the entire system.
- <sup>(2)</sup> Background monitoring was performed at those wells associated with the Pilot System prior to initial air injection . Monitoring was once 2 weeks before the initial injection and then daily for the first 3 days immediately prior to the initial air injection. In addition, daily monitoring of these wells for DO and ORP occurred on the first 4 days following the start of injection. Samples for VOC analyses were collected only once.
- <sup>(3)</sup> TICs will be analyzed/reported for first sampling event of each new well and next sampling event of any existing well. If TICs are not present in a well no future analysis/reporting of TICs in such well will be performed. If TICs are present in a well, TIC analysis/reporting will continue until TICs are no longer present.
- <sup>(4)</sup> Ground Surface in vicinity of Shallow Vadose Zone Well with the highest PID reading greater than 10 above background.
- <sup>(5)</sup> Background monitoring/sampling was be performed once only prior to initial air injection (completed).
- <sup>(6)</sup> Annually for first two years

## APPENDIX A

### AS-RECORDED DRAWINGS

<i>Drawing No.</i>	<i>Rev. No.</i>	<i>Date</i>	<i>Title</i>
Civil/Structural			
CI-02	1	08/29/12	Injection Well Site Plan
CI-03	1	08/29/12	Injection Wells IW-16, 17, 18, 19
CI-04	1	08/29/12	Misc. Sections and Details
CI-05	1	08/29/12	Injection Wells IW-1 through IW-7 and CH-8
CI-06	1	08/29/12	Injection Wells IW-15, 20, 21, 22
ST-01	1	08/29/12	Control Building - General Notes
ST-02	1	08/29/12	Control Building -Floor Plan
ST-03	1	08/29/12	Control Building - Elevations
ST-04	1	08/29/12	Control Building -Section and Details
ST-05	1	08/29/12	Control Building -Schedule and Details
ST-06	1	08/29/12	Control Building -Foundation Plan
ST-07	1	08/29/12	Control Building - Miscellaneous Details



<i>Drawing No.</i>	<i>Rev. No.</i>	<i>Date</i>	<i>Title</i>
Engineering Flow Sheets			
EF-00	1	08/29/12	Engineering Flowsheet - Legend
EF-01 S1	1	08/29/12	Engineering Flowsheet - Process Equipment
EF-01 S1	1	08/29/12	Engineering Flowsheet - Process Equipment
EF-02	1	08/29/12	Engineering Flowsheet - Middle Fence Injection Wells
EF-03	1	08/29/12	Engineering Flowsheet - Middle Fence Injection Wells
EF-04	1	08/29/12	Engineering Flowsheet - Middle Fence Injection Wells
EF-05	1	08/29/12	Engineering Flowsheet - Middle Fence Injection Wells
EF-06	1	08/29/12	Engineering Flowsheet - North Fence Injection Wells
EF-07	1	08/29/12	Engineering Flowsheet - North Fence Injection Wells
EF-08	1	08/29/12	Engineering Flowsheet - North Fence Injection Wells

<i>Drawing No.</i>	<i>Rev. No.</i>	<i>Date</i>	<i>Title</i>
Mechanical / Piping			
MP-01	1	08/29/12	Control Building and Well - Field Piping Plan
MP-02	1	08/29/12	Control Building - Equipment Layout at Grade
MP-03	1	08/29/12	Control Building - Equipment Layout (Upper)
MP-04	1	08/29/12	Control Building - Equipment Sections
MP-05	1	08/29/12	Well Details
MP-06	1	08/29/12	Injection Wells IW-16, 17, 18 & 19 - Plan and Sections
MP-07	1	08/29/12	Injection Wells IW-15, 20, 21 & 22 - Plan and Sections
MP-08	1	08/29/12	Lavatory Plumbing
MP-09	1	08/29/12	Injection Well IW-08 - Plan and Sections
MP-10	1	08/29/12	Injection Wells IW-01 Thru IW-07 - Plan and Sections
MP-11	1	08/29/12	Removed
MP-12	1	08/29/12	Line List
MP-13	1	08/29/12	Injection Wells IW-21A - Plan and Sections
MP-14	1	08/29/12	Injection Wells IW-21 - Plan and Sections

<i>Drawing No.</i>	<i>Rev. No.</i>	<i>Date</i>	<i>Title</i>
Electrical / Instrumentation			
E-01	1	08/29/12	Electrical Instrumentation Site Plan
E-02	1	08/29/12	Control Building Single Line Diagram
E-03	1	08/29/12	Control Building - Grounding Plan and Details
E-04	1	08/29/12	Control Building - Lighting Plan and Details
E-05	1	08/29/12	Control Building - Panelboard Schedules
E-06	1	08/29/12	Control Building Power Plan
E-07 SHT.1	1	08/29/12	Control Building Motor Schematic Diagrams
E-07 SHT.2	1	08/29/12	Control Building Motor Schematic Diagrams
E-08	1	08/29/12	Control System Network Architecture
E-09	1	08/29/12	Control Building Instrumentation Plan and Details
E-10	1	08/29/12	Main PLC Control Panel Arrangement
E-11-SHT.1	1	08/29/12	Main PLC Control Panel Wiring Diagram
E-11-SHT.2	1	08/29/12	Main PLC Control Panel Analog Input Wiring Diagram
E-11-SHT.3	1	08/29/12	Main PLC Control Panel Analog Output Wiring Diagram
E-11-SHT.4	1	08/29/12	Main PLC Control Panel Digital Input Wiring Diagram (1 of 2)
E-11-SHT.5	1	08/29/12	Main PLC Control Panel Digital Input Wiring Diagram (2 of 2)
E-11-SHT.6	1	08/29/12	Main PLC Control Panel Digital Output Wiring Diagram
E-12	1	08/29/12	Injection Wells Plan, Section and Details
E-13	1	08/29/12	Injection Wells Heat Tracing Plan, Section and Details
E-14	1	08/29/12	Injection Wells Typical Electrical Wiring Diagram
E-15	1	08/29/12	Typical Injection Well Remote I/O Panel Arrangement
E-16 SHT.1	1	08/29/12	Injection Well IW-1 Remote I/O Panel Wiring Diagram
E-16 SHT.2	1	08/29/12	Injection Well IW-2 Remote I/O Panel Wiring Diagram
E-16 SHT.3	1	08/29/12	Injection Well IW-3 Remote I/O Panel Wiring Diagram
E-16 SHT.4	1	08/29/12	Injection Well IW-4 Remote I/O Panel Wiring Diagram
E-16 SHT.5	1	08/29/12	Injection Well IW-5 Remote I/O Panel Wiring Diagram
E-16 SHT.6	1	08/29/12	Injection Well IW-6 Remote I/O Panel Wiring Diagram
E-16 SHT.7	1	08/29/12	Injection Well IW-7 Remote I/O Panel Wiring Diagram
E-16 SHT.15	1	08/29/12	Injection Well IW-15 Remote I/O Panel Wiring Diagram
E-16 SHT.16	1	08/29/12	Injection Well IW-16 Remote I/O Panel Wiring Diagram
E-16 SHT.17	1	08/29/12	Injection Well IW-17 Remote I/O Panel Wiring Diagram
E-16 SHT.18	1	08/29/12	Injection Well IW-18 Remote I/O Panel Wiring Diagram
E-16 SHT.19	1	08/29/12	Injection Well IW-19 Remote I/O Panel Wiring Diagram
E-16 SHT.20	1	08/29/12	Injection Well IW-20 Remote I/O Panel Wiring Diagram
E-16 SHT.21	1	08/29/12	Injection Well IW-21 Remote I/O Panel Wiring Diagram
E-16 SHT.22	1	08/29/12	Injection Well IW-22 Remote I/O Panel Wiring Diagram

DRAWING INDEX

DWG. N °	REV. N °	DATE	TITLE
CIVIL / STRUCTURAL			
CI-02	1	08/29/12	INJECTION WELL SITE PLAN
CI-03	1	08/29/12	INJECTION WELLS IW - 16, 17, 18, 19
CI-04	1	08/29/12	MISC. SECTIONS AND DETAILS SECTIONS AND DETAILS
CI-05	1	08/29/12	INJECTION WELLS IW - 1 THROUGH IW-7, AND CH - 8
CI-06	1	08/29/12	INJECTION WELLS IW - 15, 20, 21, 22
ST-01	1	08/29/12	CONTROL BUILDING - GENERAL NOTES
ST-02	1	08/29/12	CONTROL BUILDING - FLOOR PLAN
ST-03	1	08/29/12	CONTROL BUILDING - ELEVATIONS
ST-04	1	08/29/12	CONTROL BUILDING - SECTION AND DETAILS
ST-05	1	08/29/12	CONTROL BUILDING - SCHEDULE & DETAILS
ST-06	1	08/29/12	CONTROL BUILDING - FOUNDATION PLAN
ST-07	1	08/29/12	CONTROL BUILDING - MISCELLANEOUS DETAILS
ENGINEERING FLOW SHEETS			
EF-00	1	08/29/12	ENGINEERING FLOW SHEET - LEGEND
EF-01 S1	1	08/29/12	ENGINEERING FLOW SHEET - PROCESS EQUIPMENT
EF-01 S2	1	08/29/12	ENGINEERING FLOW SHEET - PROCESS EQUIPMENT
EF-02	1	08/29/12	ENGINEERING FLOW SHEET - MIDDLE FENCE INJECTION WELLS
EF-03	1	08/29/12	ENGINEERING FLOW SHEET - MIDDLE FENCE INJECTION WELLS
EF-04	1	08/29/12	ENGINEERING FLOW SHEET - MIDDLE FENCE INJECTION WELLS
EF-05	1	08/29/12	ENGINEERING FLOW SHEET - MIDDLE FENCE INJECTION WELLS
EF-06	1	08/29/12	ENGINEERING FLOW SHEET - NORTH FENCE INJECTION WELLS
EF-07	1	08/29/12	ENGINEERING FLOW SHEET - NORTH FENCE INJECTION WELLS
EF-08	1	08/29/12	ENGINEERING FLOW SHEET - NORTH FENCE INJECTION WELLS
MECHANICAL / PIPING			
MP-01	1	08/29/12	CONTROL BUILDING AND WELL - FIELD PIPING PLAN
MP-02	1	08/29/12	CONTROL BUILDING - EQUIPMENT LAYOUT AT GRADE
MP-03	1	08/29/12	CONTROL BUILDING - EQUIPMENT LAYOUT (UPPER)
MP-04	1	08/29/12	CONTROL BUILDING - EQUIPMENT SECTIONS
MP-05	1	08/29/12	WELL DETAILS
MP-06	1	08/29/12	INJECTION WELLS IW-16, 17 ,18 & 19 - PLAN AND SECTIONS
MP-07	1	08/29/12	INJECTION WELLS IW-15, 20 AND 22 - PLAN AND SECTIONS
MP-08	1	08/29/12	LAVATORY PLUMBING
MP-09	1	08/29/12	INJECTION WELL IW-08 - PLAN AND SECTIONS
MP-10	1	08/29/12	INJECTION WELLS IW-01 THRU IW-07 - PLAN AND SECTIONS
MP-11			REMOVED
MP-12	1	08/29/12	LINE LIST
MP-13	1	08/29/12	INJECTION WELLS IW-21A - PLAN AND SECTIONS
MP-14	1	08/29/12	INJECTION WELLS IW-21 - PLAN AND SECTIONS
ELECTRICAL / INSTRUMENTATION (NOT INCLUDED - TO BE PROVIDED AT LATER DATE)			
E-01	1	08/29/12	ELECTRICAL/INSTRUMENTATION SITE PLAN
E-02	1	08/29/12	CONTROL BUILDING SINGLE LINE DIAGRAM
E-03	1	08/29/12	CONTROL BUILDING - GROUNDING PLAN AND DETAILS
E-04	1	08/29/12	CONTROL BUILDING - LIGHTING PLAN AND DETAILS
E-05	1	08/29/12	CONTROL BUILDING - PANELBOARD SCHEDULES
E-06	1	08/29/12	CONTROL BUILDING POWER PLAN
E-07 SHT. 1	1	08/29/12	CONTROL BUILDING MOTOR SCHEMATIC DIAGRAMS
E-07 SHT. 2	1	08/29/12	CONTROL BUILDING MOTOR SCHEMATIC DIAGRAMS
E-08	1	08/29/12	CONTROL SYSTEM NETWORK ARCHITECTURE
E-09	1	08/29/12	CONTROL BUILDING INSTRUMENTATION PLAN AND DETAILS
E-10	1	08/29/12	MAIN PLC CONTROL PANEL ARRANGEMENT
E-11 SHT. 1	1	08/29/12	MAIN PLC CONTROL PANEL WIRING DIAGRAM
E-11 SHT. 2	1	08/29/12	MAIN PLC CONTROL PANEL ANALOG INPUT WIRING DIAGRAM
E-11 SHT. 3	1	08/29/12	MAIN PLC CONTROL PANEL ANALOG OUTPUT WIRING DIAGRAM
E-11 SHT. 4	1	08/29/12	MAIN PLC CONTROL PANEL DIGITAL INPUT WIRING DIAGRAM (1 OF 2)
E-11 SHT. 5	1	08/29/12	MAIN PLC CONTROL PANEL DIGITAL INPUT WIRING DIAGRAM (2 OF 2)
E-11 SHT. 6	1	08/29/12	MAIN PLC CONTROL PANEL DIGITAL OUTPUT WIRING DIAGRAM
E-12	1	08/29/12	INJECTION WELLS PLAN, SECTION & DETAILS
E-13	1	08/29/12	INJECTION WELLS HEAT TRACING PLAN, SECTION & DETAILS
E-14	1	08/29/12	INJECTION WELLS TYPICAL ELECTRICAL WIRING DIAGRAM
E-15	1	08/29/12	TYPICAL INJECTION WELL REMOTE I/O PANEL ARRANGEMENT
E-16 SHT. 1	1	08/29/12	INJECTION WELL IW-1 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 2	1	08/29/12	INJECTION WELL IW-2 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 3	1	08/29/12	INJECTION WELL IW-3 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 4	1	08/29/12	INJECTION WELL IW-4 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 5	1	08/29/12	INJECTION WELL IW-5 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 6	1	08/29/12	INJECTION WELL IW-6 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 7	1	08/29/12	INJECTION WELL IW-7 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 15	1	08/29/12	INJECTION WELL IW-15 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 16	1	08/29/12	INJECTION WELL IW-16 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 17	1	08/29/12	INJECTION WELL IW-17 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 18	1	08/29/12	INJECTION WELL IW-18 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 19	1	08/29/12	INJECTION WELL IW-19 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 20	1	08/29/12	INJECTION WELL IW-20 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 22	1	08/29/12	INJECTION WELL IW-22 REMOTE I/O PANEL WIRING DIAGRAM

HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE  
TREATMENT SYSTEM  
MIDDLE AND NORTH INJECTION FENCE  
UNDERGROUND VAULTS

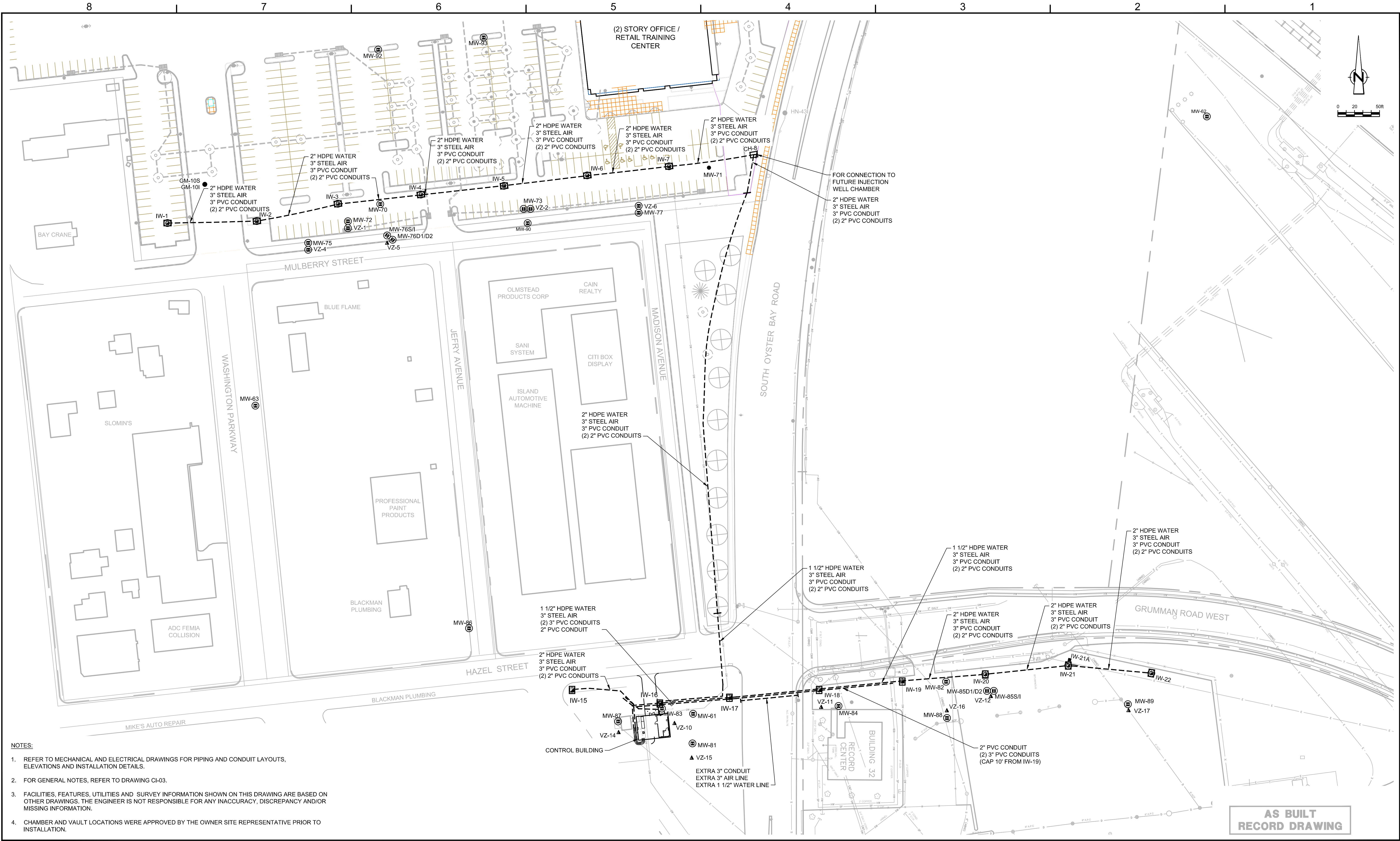
AS BUILT

06883-00(056)



CRA Infrastructure  
& Engineering, Inc.





**LEGEND**

----- FORCEMAIN AND CONDUIT ALIGNMENT

● IW-6 INJECTION WELL LOCATION

● MW-90 MONITORING WELL LOCATION

⊠ MW-78 MONITORING WELL NEST AND VADOSE ZONE

⊠ VZ-7 MONITORING WELL NEST LOCATION

⊠ CHAMBER

**SCALE VERIFICATION:** THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	JA

**WARNING:** ALTERING THIS DOCUMENT IS IN VIOLATION OF THE NEW YORK STATE EDUCATION LAW EXCEPTING AS PROVIDED IN SECTION 7209, PART 2 OF THE LAW.

**HOOVER/ RUCO SITE**  
**HICKSVILLE, NEW YORK**

**BIOSPARGE TREATMENT SYSTEM**

**INJECTION WELL SITE PLAN**

**CRA**

**CRA Infrastructure & Engineering, Inc.**

Source Reference:

Project Manager: J. KAY

Scale: AS NOTED

Date: SEPTEMBER 2003

Reviewed By: J. WORRALL

Project No: 06883-00

Designed By: J. THORNTON

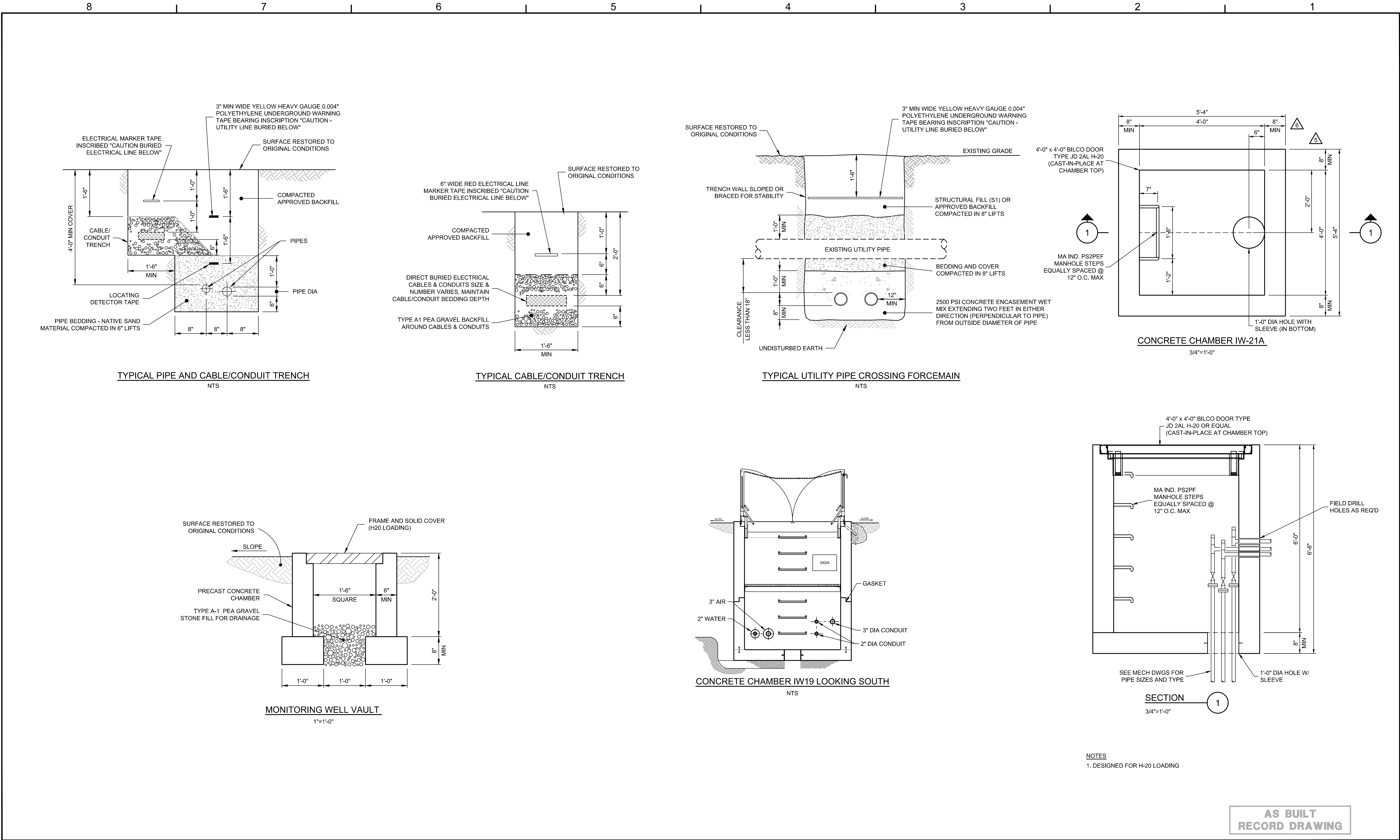
Report No: 056


Drawn By: C. ROHRICH

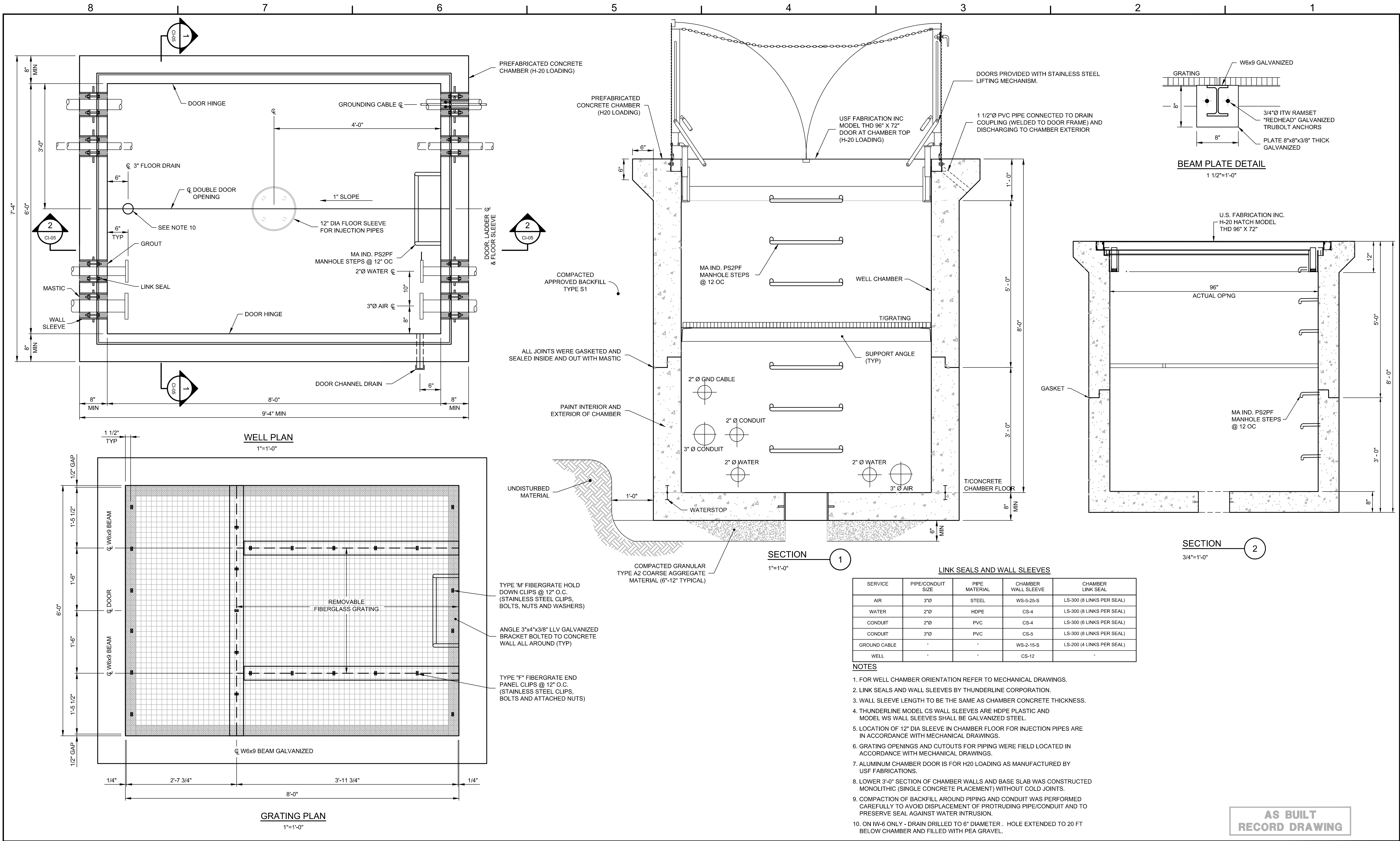
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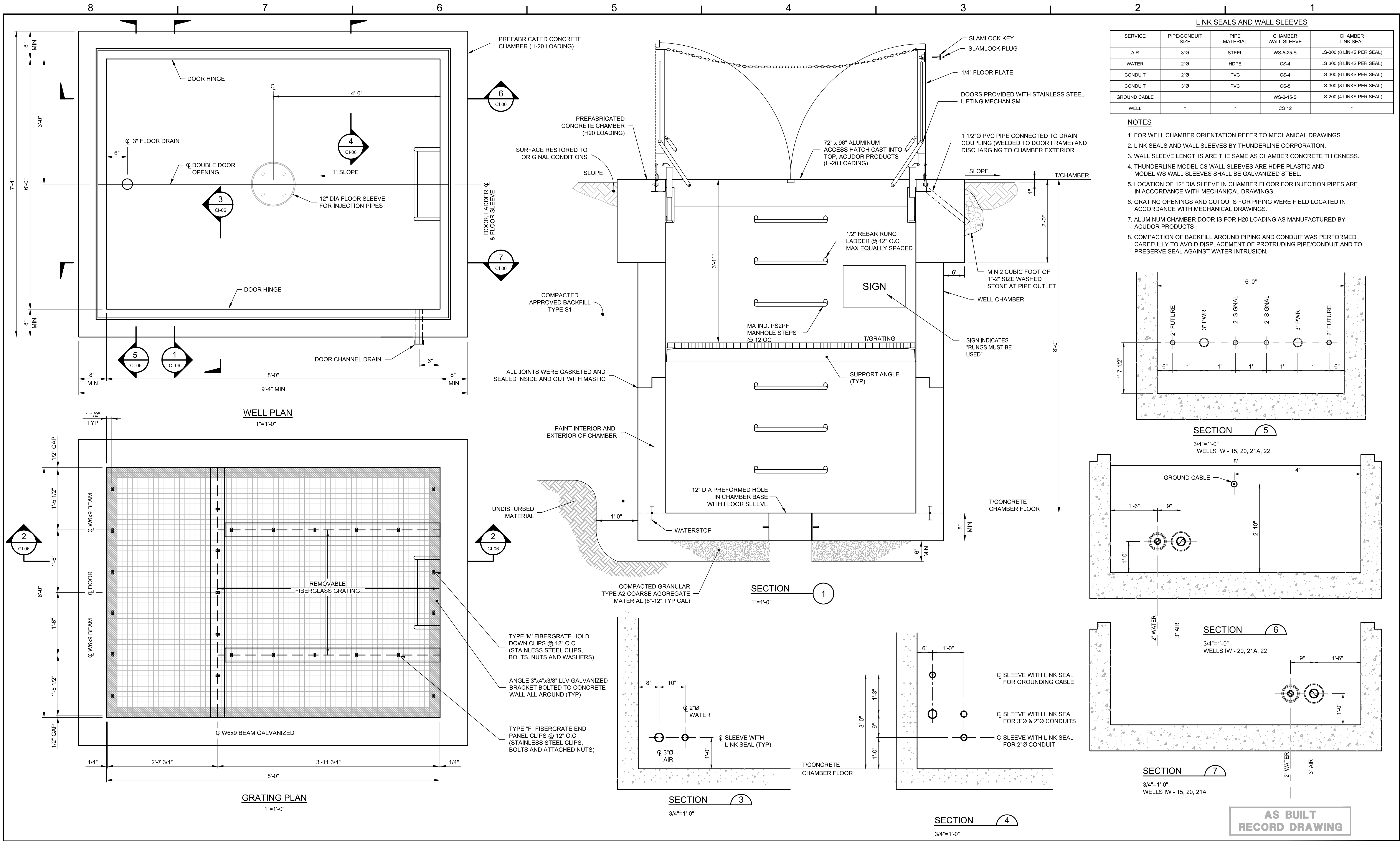


				SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.								HOOKER/ RUCO SITE HICKSVILLE, NEW YORK				 <b>CRA Infrastructure &amp; Engineering, Inc.</b>			
												BIOSPARGE TREATMENT SYSTEM							
												MISC. SECTIONS AND DETAILS							



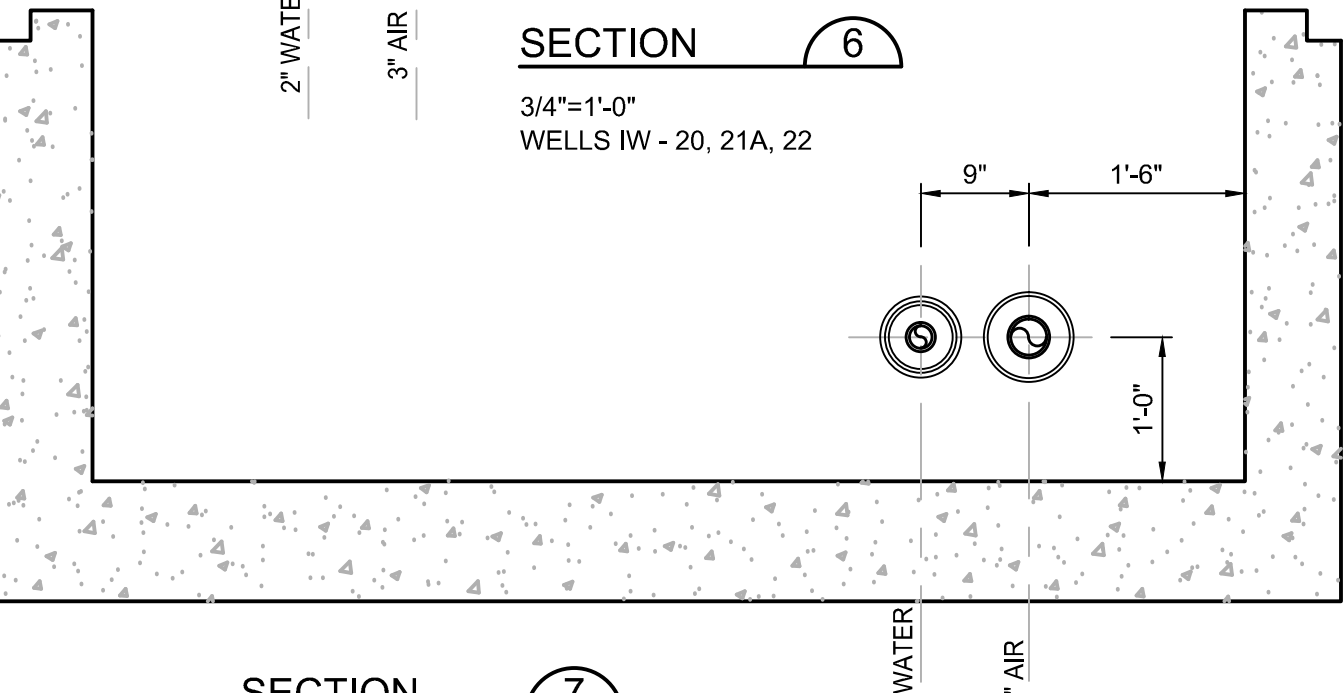
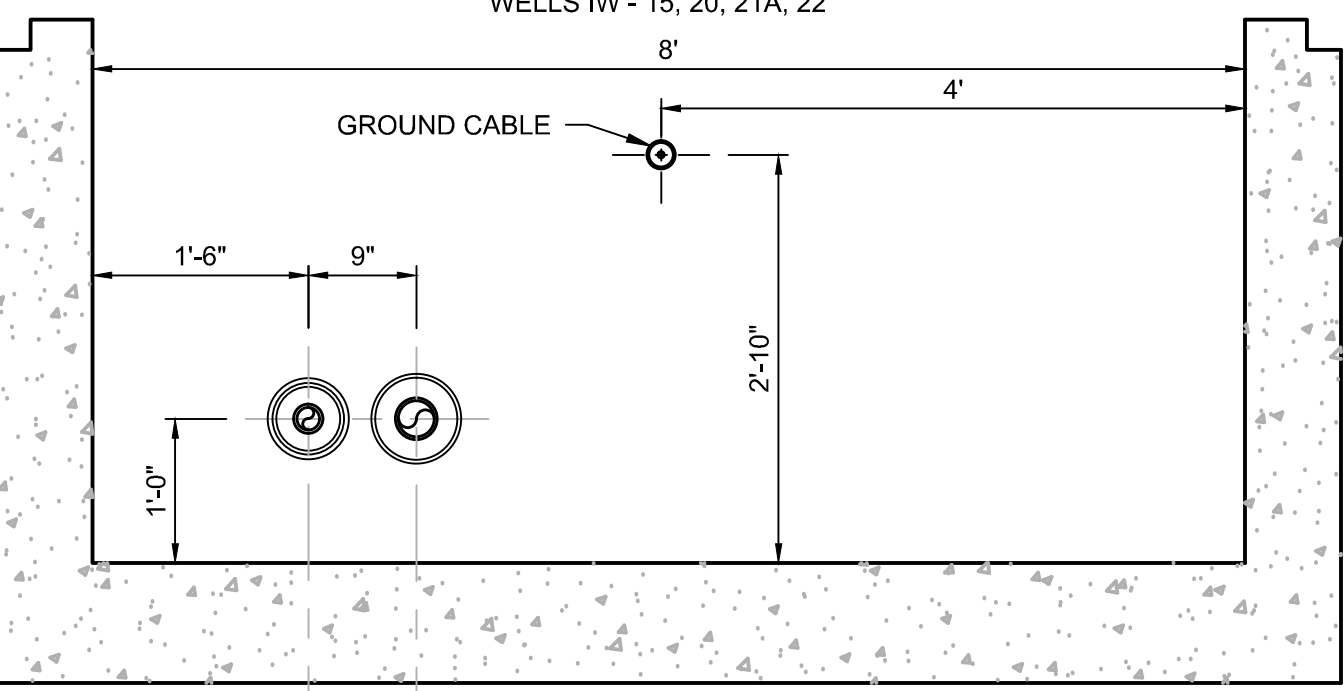
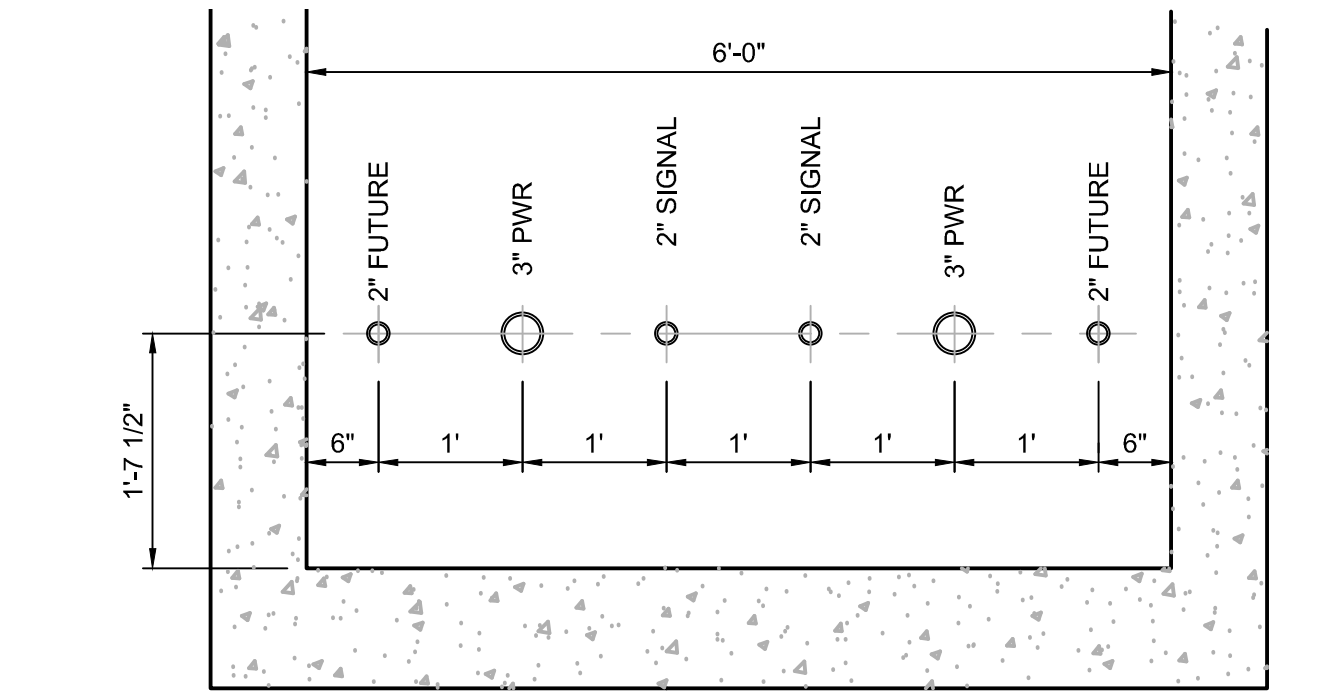
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LINK SEALS AND WALL SLEEVES				
SERVICE	PIPE/CONDUIT SIZE	PIPE MATERIAL	CHAMBER WALL SLEEVE	CHAMBER LINK SEAL
AIR	3"Ø	STEEL	WS-5-25-S	LS-300 (8 LINKS PER SEAL)
WATER	2"Ø	HDPE	CS-4	LS-300 (8 LINKS PER SEAL)
CONDUIT	2"Ø	PVC	CS-4	LS-300 (6 LINKS PER SEAL)
CONDUIT	3"Ø	PVC	CS-5	LS-300 (8 LINKS PER SEAL)
GROUND CABLE	-	-	WS-2-15-S	LS-200 (4 LINKS PER SEAL)
WELL	-	-	CS-12	-

- NOTES
1. FOR WELL CHAMBER ORIENTATION REFER TO MECHANICAL DRAWINGS.
  2. LINK SEALS AND WALL SLEEVES BY THUNDERLINE CORPORATION.
  3. WALL SLEEVE LENGTHS ARE THE SAME AS CHAMBER CONCRETE THICKNESS.
  4. THUNDERLINE MODEL CS WALL SLEEVES ARE HDPE PLASTIC AND MODEL WS WALL SLEEVES SHALL BE GALVANIZED STEEL.
  5. LOCATION OF 12" DIA SLEEVE IN CHAMBER FLOOR FOR INJECTION PIPES ARE IN ACCORDANCE WITH MECHANICAL DRAWINGS.
  6. GRATING OPENINGS AND CUTOUTS FOR PIPING WERE FIELD LOCATED IN ACCORDANCE WITH MECHANICAL DRAWINGS.
  7. ALUMINUM CHAMBER DOOR IS FOR H2O LOADING AS MANUFACTURED BY ACUDOR PRODUCTS
  8. COMPACTION OF BACKFILL AROUND PIPING AND CONDUIT WAS PERFORMED CAREFULLY TO AVOID DISPLACEMENT OF PROTRUDING PIPE/CONDUIT AND TO PRESERVE SEAL AGAINST WATER INTRUSION.



AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	JA
No	Revision	Date	Initial

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HOOVER/ RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

INJECTION WELLS  
IW - 15, 20, 21, 22

**CRA Infrastructure & Engineering, Inc.**

Source Reference:		Date: SEPTEMBER 2003	
Project Manager: J. KAY	Reviewed By: J. WORRALL	Designed By: J. THORNTON	Drawn By: C. ROHRICH
Scale: AS NOTED	Project No: 06883-00	Report No: 056	Drawing No: CI-06

GENERAL NOTES

1. THE CONTRACTOR SHALL NOT SCALE THE DRAWINGS TO ESTABLISH DIMENSIONS. ALL DIMENSIONS SHALL BE CHECKED ON-SITE PRIOR TO ASSEMBLY OR CONSTRUCTION OF ANY WORK.
2. THE STRUCTURE HAS BEEN DESIGNED FOR THE IN-SERVICE LOADS. THE METHODS, PROCEDURES AND SEQUENCES OF CONSTRUCTION TO BE USED ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. SUPPORTING FORMWORK FOR CONCRETE CONSTRUCTION SHALL NOT BE REMOVED BEFORE THE CONCRETE HAS GAINED SUFFICIENT STRENGTH TO SAFELY SUPPORT THE DEAD AND SUPERIMPOSED LOADS. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID OVERLOADS, AND MAINTAIN AND INSURE THE INTEGRITY OF THE STRUCTURE AT ALL STAGES OF CONSTRUCTION.
3. THE CONTRACTOR SHALL REFER TO MECHANICAL & ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR SIZE AND LOCATION OF SLEEVES, ANCHORS, INSERTS AND OPENINGS REQUIRED.
4. PRINCIPAL OPENINGS IN THE STRUCTURE ARE SHOWN ON THE DRAWINGS. SLEEVES AND OPENINGS NOT SHOWN ON STRUCTURAL DRAWINGS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
5. MATERIALS SPECIFIED ON THE DRAWINGS AND/OR IN THE SPECIFICATIONS SHALL BE USED UNLESS THE CONTRACTOR OBTAINS WRITTEN APPROVAL OF THE ENGINEER TO USE ALTERNATIVE MATERIALS. WHEN REQUESTING SUCH APPROVAL, THE CONTRACTOR SHALL PROVIDE ADEQUATE AND DETAILED MANUFACTURER'S LITERATURE AND TECHNICAL DATA FOR EACH MATERIAL PRIOR TO ITS POTENTIAL USE.

CONCRETE NOTES

1. CONCRETE CONSTRUCTION SHALL CONFORM TO ACI 301, 305, 306, 308, 315, 318 AND 350R SPECIFICATIONS.
2. LATEST REVISION AND/OR VERSION OF ALL CODES AND REFERENCE STANDARDS SHALL BE FOLLOWED.
3. CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS. SLUMP SHALL BE 3 1/2 INCHES ± 1 INCH.
4. CONCRETE SHALL BE AIR ENTRAINED. CEMENT SHALL BE PORTLAND CEMENT CONFORMING TO ASTM C150, TYPE II WITH AIR-ENTRAINING ADMIXTURE CONFORMING TO ASTM C260. AIR CONTENT (% BY VOLUME) SHALL NOT BE LESS THAN 4% NOR GREATER THAN 6.5% AND SHALL DEPEND ON MAXIMUM SIZE AGGREGATE USED.
5. NO ADMIXTURE SHALL CONTAIN CALCIUM CHLORIDE BASED COMPOUNDS. FLYASH AND POZZOLAN CONTENT SHALL NOT EXCEED 20% BY WEIGHT OF CEMENT.
6. REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS.
7. LAP SPLICES IN REINFORCING BARS SHALL BE A MINIMUM 38 TIMES BAR DIAMETERS. THE SPLICES SHALL NOT BE LESS THAN 18 INCHES.
8. CONCRETE PROTECTION FOR REINFORCING BARS (UNLESS OTHERWISE NOTED):  
A. FOOTINGS - 3 INCH BOTTOM AND SIDES, 2 INCH TOP  
B. GRADE BEAMS - 2 INCH BOTTOM AND SIDES, 1 1/2 INCH TOP (TO STIRRUPS)  
C. PIERS - 1 1/2 INCH (TO TIES)  
D. FORMED SLABS - 1 1/2 INCH TOP AND BOTTOM  
E. WALLS AND PADS - 2 INCH  
F. EXTERIOR SLABS ON FILL - 2 1/2 INCH BOTTOM, 2 INCH TOP  
G. INTERIOR SLABS ON FILL - 2 1/2 INCH BOTTOM, 1 1/2 INCH TOP
9. ANCHOR BOLTS SHALL BE CARBON STEEL CONFORMING TO ASTM A307 SPECIFICATIONS, WITH HEAVY HEX NUTS AND WASHERS. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED CONFORMING TO ASTM A123 AND A153 SPECIFICATIONS, AND SHALL BE ACCURATELY PLACED USING TEMPLATES.
10. NO CONSTRUCTION JOINT SHALL BE MADE UNLESS SHOWN ON DRAWINGS OR APPROVED IN WRITING BY THE ENGINEER.
11. GROUT IN DRILLED HOLES FOR ANCHOR BOLTS AND REINFORCING STEEL DOWELS, AND UNDER BASE PLATES SHALL BE NON-SHRINK NON-METALLIC "MASTERFLOW 713" OR "MASTERFLOW 928" BY DEGUSSA BUILDING SYSTEMS. MANUFACTURER'S INSTRUCTIONS CONCERNING HOLE SIZE, SURFACE PREPARATION AND INSTALLATION SHALL BE FOLLOWED.
12. EDGE TOOL TOP HORIZONTAL EDGES OF PIERS, EQUIPMENT (PUMP) PADS. OTHER EXPOSED EDGES SHALL HAVE 3/4 INCH CHAMFER.
13. RAMPS, PADS AND SLABS SHALL BE TROWEL FINISHED TO WITHIN 1/8 INCH OF ELEVATIONS SHOWN ON DRAWINGS. FOLLOWING TROWELLING, PROVIDE NON-SLIP MEDIUM BROOM FINISH.
14. PROVIDE CORNER BARS TO MATCH HORIZONTAL BARS AT ALL EXTERIOR CORNERS.
15. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A82 AND A185 SPECIFICATIONS.
16. PROVIDE MINIMUM OF 6 INCH MECHANICALLY COMPACTED CRUSHED STONE UNDER SLABS AND WHERE OTHERWISE NOTED ON DRAWINGS.
17. JOINT SEALANT SHALL BE ONE-COMPONENT POLYURETHANE "SIKAFLEX-1A" BY SIKa CHEMICAL CORPORATION.
18. WATERSTOPS SHALL BE 6 INCH FLAT RIBBED PVC WATERSTOPS R6-316 OR 4 INCH RIBBED CENTER BULB PVC WATERSTOPS RB4-316 BY VINYLEX CORPORATION. WATERSTOPS SHALL BE HEAT FUSED AT ALL JOINTS.
19. PERIMETER FOUNDATION WALL RIGID INSULATION SHALL BE STYROFOAM SQUARE EDGE BY DOW CHEMICAL COMPANY; AND LATEX MODIFIED CONCRETE FACING, TONGUE AND GROOVE FORMAT, WITH GALVANIZED CLIPS AND FASTENERS.
20. PRIOR TO CASTING CONCRETE PADS AND PIERS, BASE SLAB AND WALL SHALL BE ROUGHENED, CLEANED AND COATED WITH A CONCRETE BONDING AGENT. BONDING AGENT SHALL BE "CONCRESEIVE LIQUID (LPL)" OR "CONCRESEIVE PASTE (LPL)" BY DEGUSSA BUILDING SYSTEMS. MANUFACTURER'S INSTRUCTIONS CONCERNING SURFACE PREPARATION AND APPLICATION SHALL BE FOLLOWED.

STRUCTURAL STEEL NOTES

1. FABRICATION, ERECTION AND WORKMANSHIP SHALL CONFORM TO THE DESIGN DRAWINGS, SCOPE OF WORK AND SPECIFICATIONS, AND SHALL BE IN ACCORDANCE WITH THE AISC SPECIFICATIONS.
2. LATEST REVISION AND/OR VERSION OF ALL CODES AND REFERENCE STANDARDS SHALL BE FOLLOWED.
3. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 SPECIFICATIONS. STRUCTURAL TUBING SHALL CONFORM TO ASTM A500 GRADE B WITH YIELD STRESS OF 46 KSI.
4. ALL DIMENSIONS SHALL BE FIELD CHECKED BEFORE FABRICATION MAY BEGIN.
5. WELDING SHALL BE IN ACCORDANCE WITH THE AWS STRUCTURAL WELDING CODE. WELDED CONNECTIONS SHALL BE MADE WITH E70XX ELECTRODES. ROOT PASS AND TACK WELDS SHALL BE MADE WITH E6010 ELECTRODES. FILLET WELDS ON STANDARD FRAMED BEAM CONNECTIONS MAY BE 3/16 INCH MINIMUM. ALL OTHER FILLET WELDS SHALL BE 1/4 INCH MINIMUM.
6. GUSSET PLATES AND CLIP ANGLES SHALL BE 5/16 INCH THICK MINIMUM (UNLESS OTHERWISE NOTED). GENERALLY, ONE-SIDED CONNECTIONS FOR BEAMS SHALL NOT BE USED.
7. SHOP CONNECTIONS MAY BE EITHER WELDED OR BOLTED. FIELD CONNECTIONS SHALL BE BOLTED (UNLESS OTHERWISE NOTED). CONNECTIONS FOR NEW STEEL FRAMING TO EXISTING STEEL SHALL HAVE ONE END OF MEMBER BOLTED TO ALLOW FOR ADJUSTMENTS. WELDED CONNECTIONS, FIELD AND SHOP, SHALL BE CONTINUOUS FULL PENETRATION SEAL WELDS.
8. FASTENERS SHALL BE HIGH STRENGTH ASTM A325-N, 3/4 INCH DIAMETER GALVANIZED BOLTS WITH ASTM A194 GRADE 2H OR A563 GRADE DH NUTS TAPPED OVERSIZE AFTER GALVANIZING AND THREADS LUBRICATED. HARDENED WASHERS SHALL BE PROVIDED UNDER ROTATING PART OF NUT AND BOLT ASSEMBLY. CONNECTIONS NOTED WITH A325-SC BOLTS SHALL BE SLIP CRITICAL PER AISC SPECIFICATIONS.
9. BOLT HOLES SHALL NOT BE LARGER THAN 1/16 INCH PLUS DIAMETER OF THE BOLT. A MINIMUM OF TWO BOLTS PER CONNECTION SHALL BE REQUIRED.
10. WHERE BRACING FORCES ARE NOT GIVEN, DESIGN CONNECTIONS AT EACH END FOR 50% OF MEMBER CAPACITY IN TENSION.
11. ALL STRUCTURAL STEEL FRAMES INCLUDING GIRTS, PURLINS, MISCELLANEOUS STEEL; DOOR/ WINDOW/OPENING FRAMES, DOORS, COMBINATION LOUVER/DAMPER AND SHUTTERS SHALL BE PAINTED.
12. PAINT SHALL CONSIST OF ONE COAT PRIMER (6 MILS DFT) EPOXY BAR-RUST 235 AND ONE COAT FINISH (2 MILS DFT) ALIPHATIC URETHANE DEVTHANE 379 BY ICI DULUX-DEVOE COATINGS.

FOUNDATION NOTES

1. FOUNDATION DESIGN IS BASED UPON A NET ALLOWABLE SOIL BEARING CAPACITY OF 3,000 POUNDS PER SQUARE FOOT FOR FOOTINGS BEARING ON APPROVED NATIVE SUBGRADE SOILS OR COMPACT STRUCTURAL GRANULAR FILL.
2. CONTRACTOR SHALL FIELD VERIFY THE FOUNDATION BEARING GRADE MATERIAL AND BEARING CAPACITY DURING CONSTRUCTION. FOUNDATIONS SHALL BE PLACED ON APPROVED BEARING GRADE.
3. NO FOOTING SHALL BEAR ON EXISTING FILL, SOFT/LOOSE, ORGANIC OR OTHER UNSUITABLE SOILS. IF ENCOUNTERED, THE EXISTING FILL AND UNSUITABLE SOILS AT THE FOOTING BEARING GRADE LEVEL SHALL BE REMOVED DOWN TO COMPETENT NATIVE SUBGRADE AND EXCAVATION BACKFILLED WITH COMPACTED STRUCTURAL GRANULAR FILL IN ACCORDANCE WITH THE SPECIFICATION.
4. EXISTING UNDERGROUND PIPING, REINFORCED CONCRETE STRUCTURES, UTILITIES, ELECTRICAL CABLES AND GROUNDING SYSTEMS NOT IDENTIFIED ON THE DRAWINGS MAY EXIST. WHEN UNCOVERED, THE CONTRACTOR MUST REPORT FINDINGS TO THE ENGINEER FOR IDENTIFICATION AND RECOMMENDED ACTION.
5. BACKFILL AROUND PIPES AND CABLES AS PER SPECIFICATIONS. NO PIPES OR CONDUITS SHALL BE PLACED IN FOOTINGS.
6. WHERE PIPES OR CONDUITS RUN PERPENDICULAR TO A FOOTING, STEP THE TOP OF THE FOOTING DOWN TO ALLOW PIPES OR CONDUITS TO RUN OVER TOP OF THE FOOTING. WHERE PIPES OR CONDUITS RUN PARALLEL TO A FOOTING, STEP BOTTOM OF FOOTING DOWN SO THAT A LINE DRAWN BETWEEN THE INVERT OF PIPE OR CONDUIT AND BOTTOM OF FOOTING SHALL NOT EXCEED 30 DEGREES ABOVE THE HORIZONTAL. NO PIPING OR CONDUIT SHALL BE ALLOWED TO PASS WITHIN A 30-DEGREE PLANE OF INFLUENCE BELOW AND AWAY FROM FOOTINGS.
7. MAXIMUM WALL FOOTING STEP SHALL BE 1'-0" VERTICAL SPACED NOT LESS THAN 2'-0" ON CENTER.
8. BUILDING FOUNDATIONS OVER EXISTING UTILITY LINES SHALL BEAR ONLY ON COMPACTED STRUCTURAL FILL PLACED AFTER REMOVAL OF ALL UNCONTROLLED FILL AND UNSUITABLE SOILS.

ARCHITECTURAL NOTES

1. BUILDING SHALL CONSIST OF PRE-ENGINEERED METAL, CLEAR SINGLE SPAN RIGID FRAME WITH STRAIGHT COLUMNS (NON-TAPERED) AND GABLED ROOF BEAMS.
2. ROOF SHALL HAVE A 2:12 PITCH.
3. ROOF PANELS SHALL BE 24 GAUGE STANDING SEAM STEEL.
4. EXTERIOR WALL PANELS SHALL BE 26 GAUGE.
5. INTERIOR WALL LINER PANELS SHALL BE 28 GAUGE (STANDARD HEIGHT 8'-3").
6. BOTTOM OF STEEL BASE PLATE TO BE AT EL. 100'-7".
7. BUILDING SHALL HAVE A 6" HIGH CURB AND 1" GROUT UNDER STEEL BASE PLATES.
8. CUTOUTS AND HOLES IN WALL AND ROOF PANELS SHALL BE COMPLETELY SEALED BY MECHANICAL/ELECTRICAL CONTRACTORS WITH FIRE STOP AND WEATHER PROOF MATERIALS AFTER PIPE/DUCT/CABLE INSTALLATIONS.
9. PAINT FOR CONTROL ROOM GYPSUM BOARD WALL SHALL CONSIST OF ONE COAT PRIMER (1 MIL DFT) ULTRA-HIDE PVA (1030) AND ONE COAT FINISH (2 MILS DFT) ULTRA-HIDE LATEX ENAMEL (1416) BY ICI PAINT STORES.
10. FIRE EXTINGUISHERS:  
CONTROL ROOM - (2 NOS) CLASS C TYPE.  
OTHER AREAS - (1 NO) CLASS ABC TYPE.
11. BASED ON USE, BUILDING IS NOT INTENDED TO BE "ACCESSIBLE" PER CODE.

PRECAST CONCRETE NOTES

1. CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 5,000 PSI AT 28 DAYS.
2. AIR ENTRAINED CONCRETE:  
A. CONCRETE SHALL BE AIR ENTRAINED  
B. CEMENT SHALL BE PORTLAND CEMENT CONFORMING TO ASTM C150, TYPE II WITH AIR ENTRAINING ADMIXTURE CONFORMING TO ASTM C260. AIR CONTENT (% BY VOLUME) SHALL NOT BE LESS THAN 5% NOR GREATER THAN 7%.
3. REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS.
4. LAP SPLICES IN REINFORCING SHALL BE IN ACCORDANCE WITH ACI 318 SPECIFICATIONS. LAP SPLICES SHALL NOT BE LESS THAN 18 INCHES.
5. CONCRETE PROTECTION FOR REINFORCING BARS SHALL BE INDUSTRY OR DOT STANDARDS, UNLESS NOTED OTHERWISE.
6. DESIGN LOADING TO MEET AASHTO HS-20-44 WITH 30% IMPACT. FOR HYDROSTATIC PRESSURE AND UPLIFT FORCES, WATER TABLE SHALL BE CONSIDERED AT THE GROUND SURFACE.
7. LIFTING HOLES IN PRECAST UNITS TO BE FILLED WITH CONCRETE REPAIR MATERIAL IN ACCORDANCE WITH NYSDOT 701-04 SPECIFICATION.

PERMIT NOTE

CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FROM CITY AND STATE AGENCIES FOR UTILITIES AND ROAD PAVEMENT INCLUDING RIGH-OF-WAY WORK.

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.



1	AS BUILT	08/29/12	ZM
No	Revision	Date	Initial

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HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

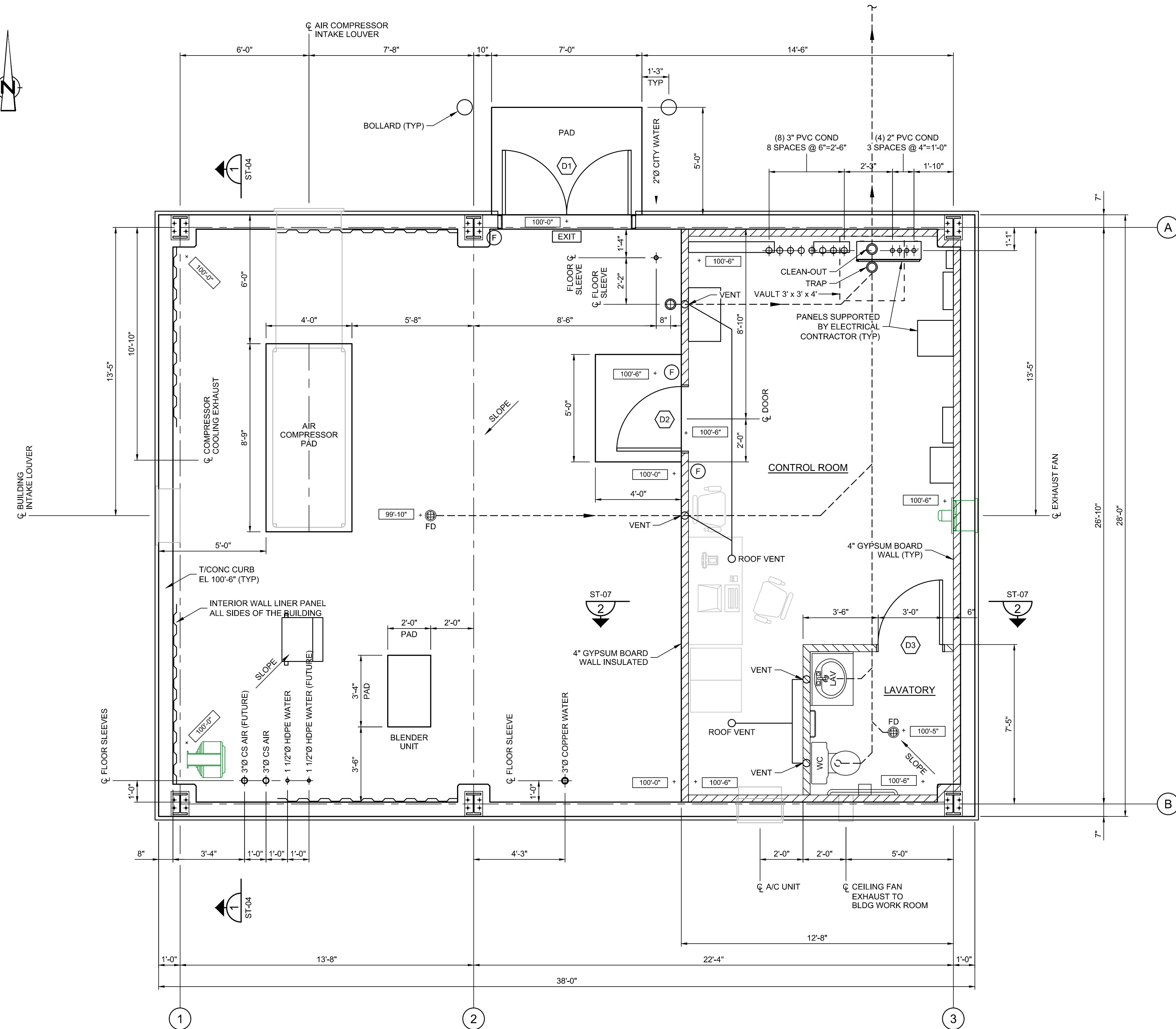
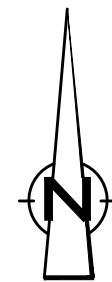
CONTROL BUILDING  
GENERAL NOTES



CRA Infrastructure  
& Engineering, Inc.

Source Reference:			Date: AUGUST 2012
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: ST-01





FLOOR PLAN  
3/8" = 1'-0"

BUILDING CODE DATA

CODE:	BUILDING CODE OF NEW YORK STATE
LOCATION:	TOWN OF OYSTER BAY, NASSAU COUNTY, NEW YORK
BUILDING DIMENSIONS:	28'-0" x 38'-0" ONE STORY
BUILDING HEIGHT:	14'-6" NOMINAL EAVE - ABOVE FLOOR
BUILDING AREA:	1,064 SQUARE FEET (TABLE 503)
OCCUPANCY CLASS:	USE GROUP F-2 FACTORY INDUSTRIAL (SECTION 306.3)
CONSTRUCTION:	NON-COMBUSTIBLE TYPE 2B (SECTION 602.2, TABLE 601)
OCCUPANT LOAD:	ACTUAL - NONE; TABLE - 10 PERSONS (SECTION 1003.2.2.2)
BUILDING TYPE:	PRE-ENGINEERED METAL, STRUCTURAL STEEL RIGID FRAMED
BUILDING INSULATION:	WALLS - R19, ROOF - R30
FIRE SEPARATION DISTANCE:	GREATER THAN 30 FEET
FIRE RESISTANCE RATING:	EXTERIOR WALL - 0 HR (TABLES 601 & 602)
FIRE SEPARATION ASSEMBLIES:	NOT REQUIRED (TABLE 302.3.3)

STRUCTURAL LOADS (NON-FACTORED)

1. DEAD LOAD	STRUCTURAL, NONSTRUCTURAL, EQUIPMENT, PIPE, CABLE
2. FLOOR LIVE LOAD	
UNIFORMLY DISTRIBUTED LOAD	125 POUNDS PER SQUARE FOOT
CONCENTRATED LOAD	2,000 POUNDS (ON 2 1/2 FT x 2 1/2 FT SQUARE AREA)
3. ROOF LIVE LOAD	
0 - 200 SQUARE FEET TRIBUTARY AREA	20 POUNDS PER SQUARE FOOT
201 - 600 SQUARE FEET TRIBUTARY AREA	16 POUNDS PER SQUARE FOOT
OVER 600 SQUARE FEET TRIBUTARY AREA	12 POUNDS PER SQUARE FOOT
CONCENTRATED LOAD	200 POUNDS (ON AREA OF ONE SQUARE INCH)
4. ROOF SNOW LOAD	
GROUND SNOW LOAD	45 POUNDS PER SQUARE FOOT (FIGURE 1608.2)
SNOW EXPOSURE FACTOR	0.9 (TABLE 1608.3.1)
SNOW LOAD IMPORTANCE FACTOR	1.0 (SECTION 1604.5)
5. WIND LOAD	
BASIC WIND SPEED (3-SECOND GUST)	120 MILES PER HOUR (FIGURE 1609)
EXPOSURE CATEGORY	C (SECTION 1609.4)
WIND LOAD IMPORTANCE FACTOR	1.0 (SECTION 1604.5)
6. EARTHQUAKE LOAD	
SEISMIC USE GROUP	GROUP I (SECTION 1616.2)
SEISMIC IMPORTANCE FACTOR	1.0 (SECTION 1604.5)
SITE CLASS	D (SECTION 1615.1.1)
7. SPECIAL LOADS	
COLLATERAL IMPOSED CEILING LOAD	10 POUNDS PER SQUARE FOOT
PIPE/CABLE & EQUIPMENT LOADS	REFER DRAWINGS
FLOOD LOAD	NONE
UNIT HEATER	250 POUNDS EACH
AIR CONDITIONER	500 POUNDS
8. DEFLECTION LIMITATION	
EXTERIOR WALL AND ROOF SYSTEMS	NOT TO EXCEED 1/240 OF SPAN OF STRUCTURAL MEMBER
9. FOUNDATION	
NET ALLOWABLE SOIL BEARING PRESSURE	3,000 POUNDS PER SQUARE FOOT
MODULUS OF SUBGRADE REACTION	200 KIPS PER CUBIC FOOT

LEGEND

+ 100'-0"	ELEVATION FEET AMSL
EXIT	EXIT SIGN INSTALLED ABOVE DOOR
F	FIRE EXTINGUISHER
D1	DOOR
→	DIRECTION OF FLOOR SLOPE
UNIT HEATER	UNIT HEATER
WALL INTERIOR PANEL	WALL INTERIOR PANEL
GYPSUM BOARD WALL (FIRE-RATED)	GYPSUM BOARD WALL (FIRE-RATED)
FD	FLOOR DRAIN

AS BUILT  
RECORD DRAWING

NOTES

- ELECTRICAL CONTRACTOR SHALL INSTALL CONDUITS IN CONTROL ROOM FLOOR SLAB AREA PRIOR TO SLAB CONSTRUCTION.
- CONTRACTOR SHALL INSTALL FLOOR SLEEVES FOR PIPING PRIOR TO SLAB CONSTRUCTION.
- REFER MECHANICAL DRAWINGS FOR PLUMBING.
- FLOOR DRAIN SHALL BE FD-2330-PV3 HEAVY DUTY WITH SEDIMENT BASKET BY ZURN (TEL. (716) 665-1131, WWW.ZURN.COM).

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1	AS BUILT	08/29/12	ZM
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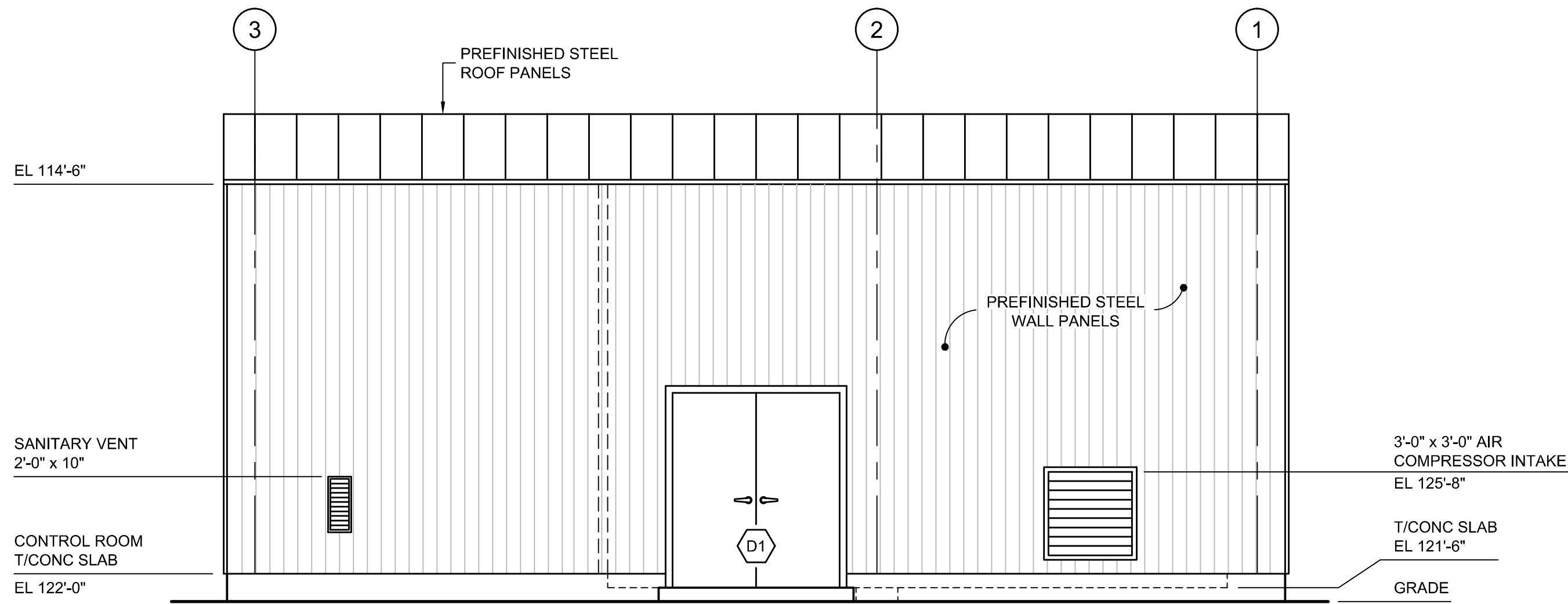
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
FLOOR PLAN

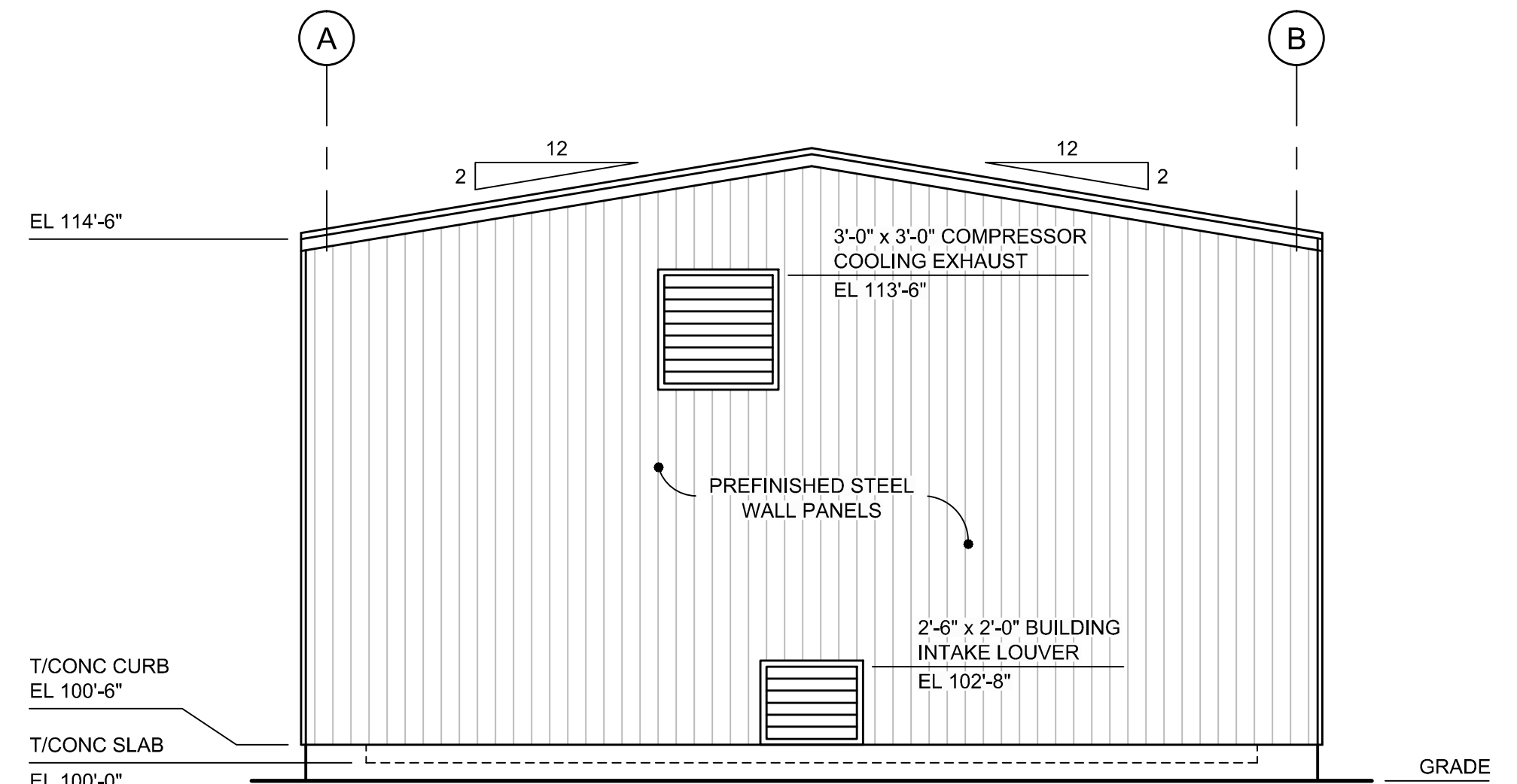


CRA Infrastructure  
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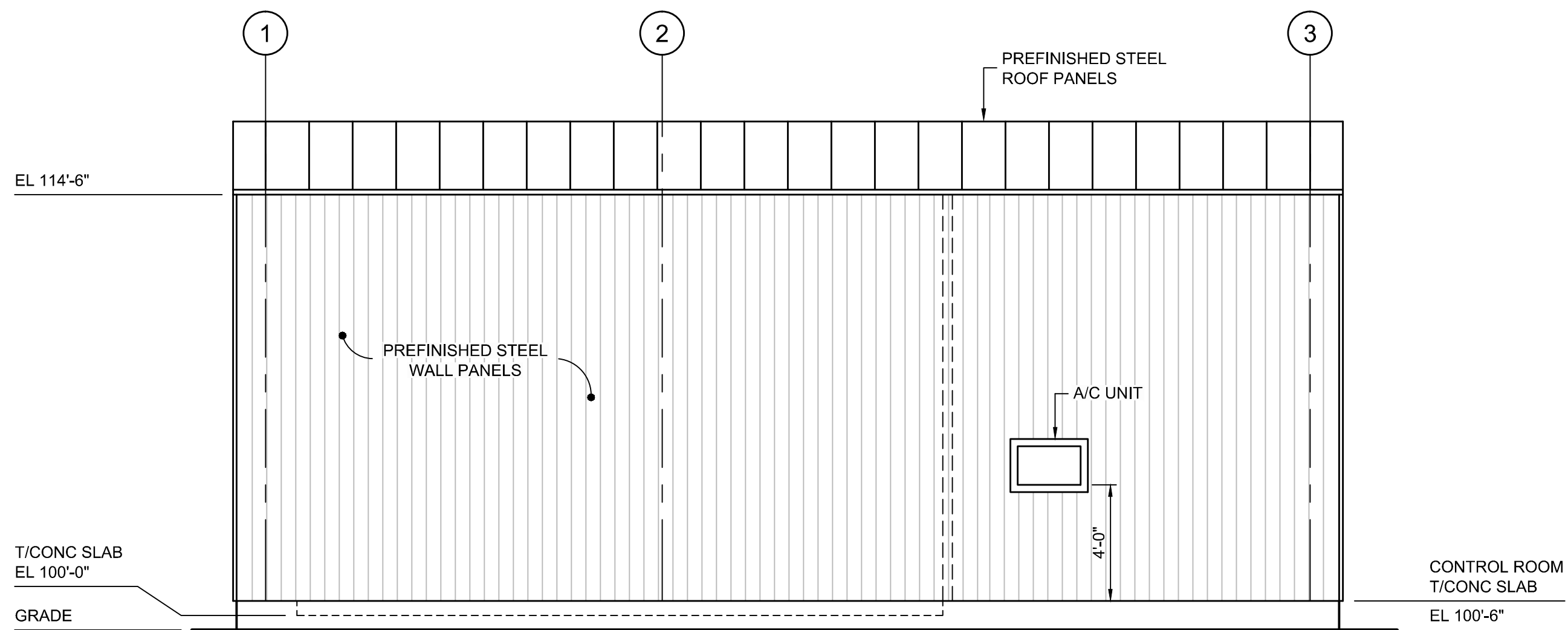
Source Reference:			Date: AUGUST 2012
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: 3/8"=1'-0"	Project No: 06883-00	Report No: 056	Drawing No: ST-02



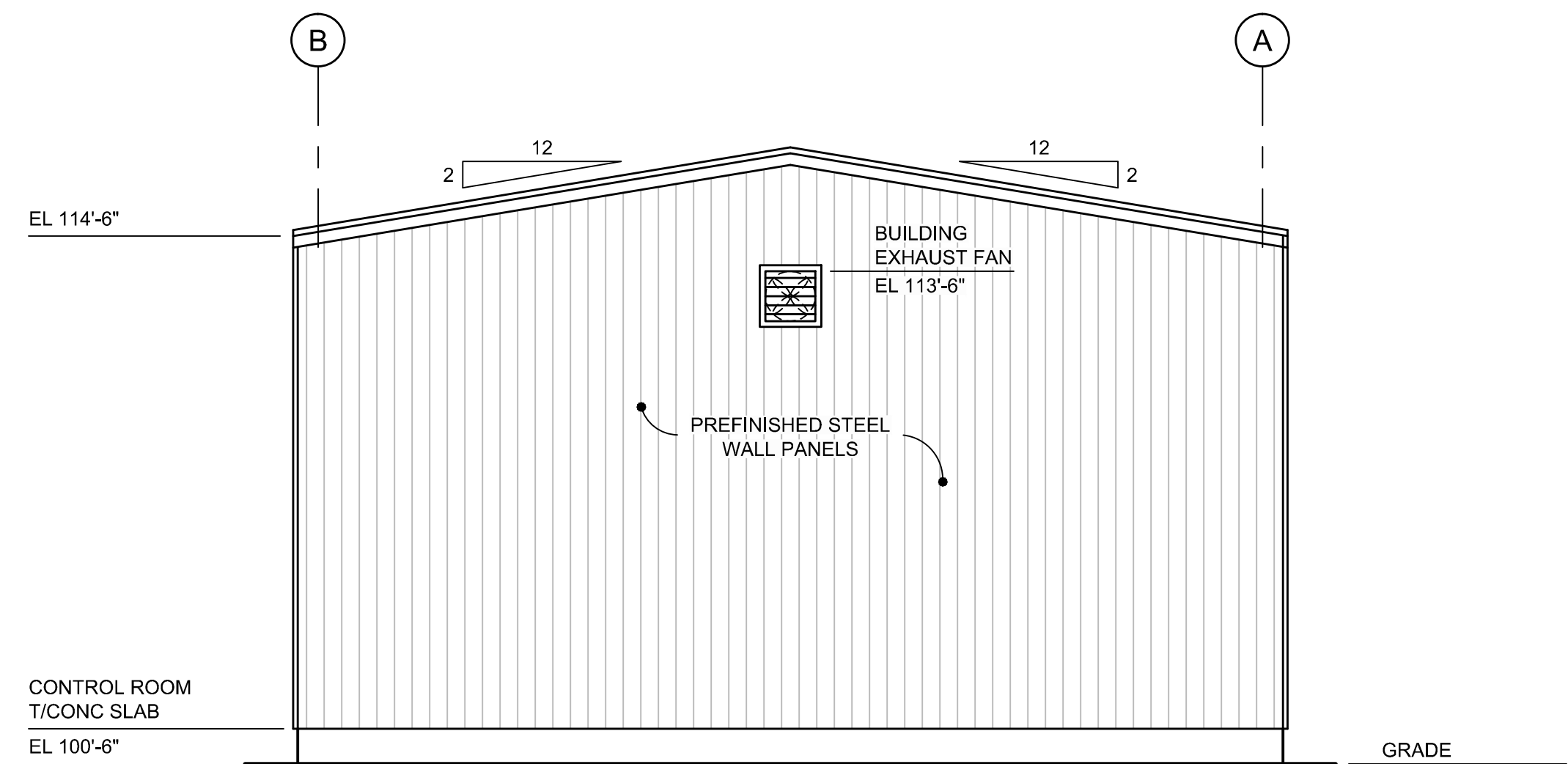
**NORTH ELEVATION**



**WEST ELEVATION**



**SOUTH ELEVATION**



**EAST ELEVATION**

CONTRACTOR SHALL PROVIDE BUILDING EXTERIOR ELEVATION OF 114'-6" AND INTERIOR CLEARANCE AT PRIMARY RIGID FRAME OF MINIMUM 12'-8" ABOVE FLOOR SLAB EL 100'-0", WHICHEVER RESULTS IN GREATER BUILDING HEIGHT

**AS BUILT  
RECORD DRAWING**

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	ZM
No	Revision	Date	Initial

Approved

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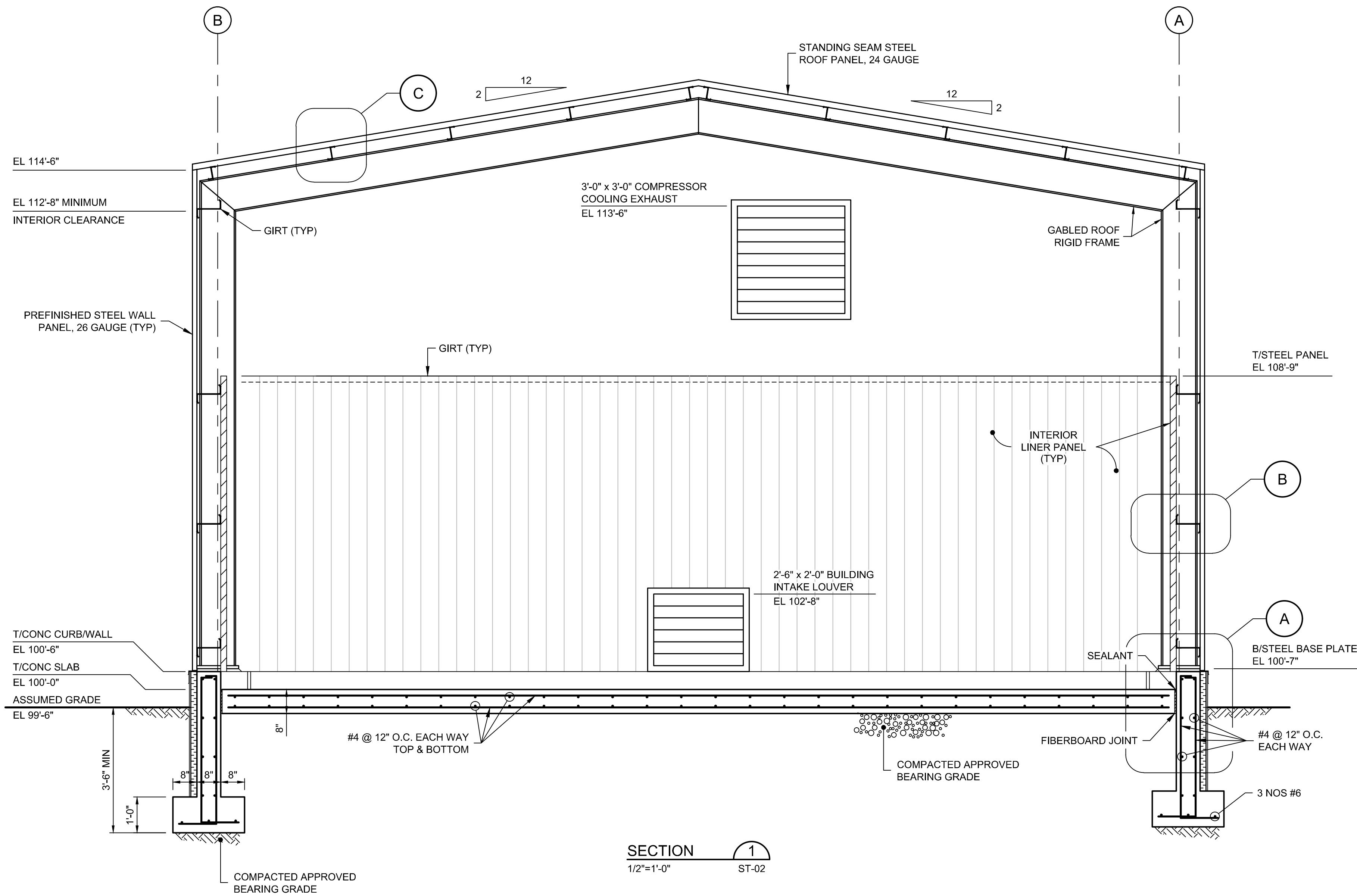
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
ELEVATIONS

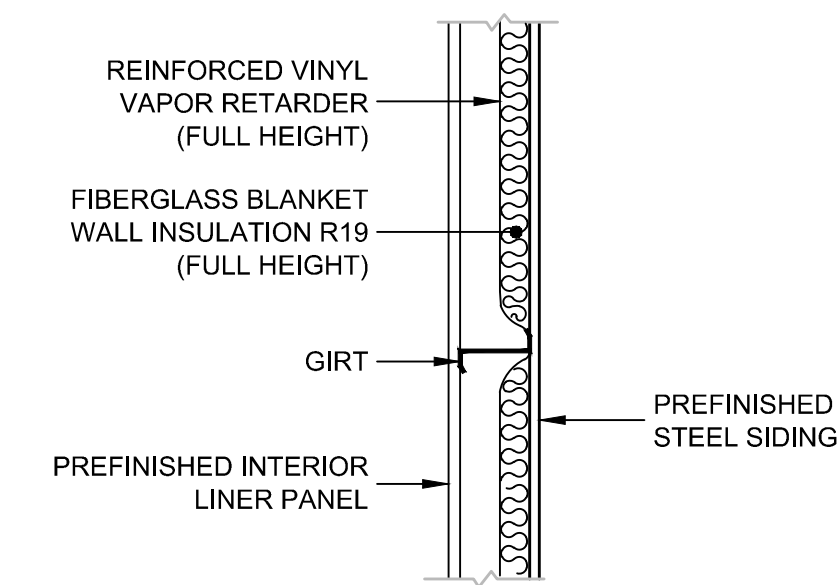


**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:			Date: AUGUST 2012
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: 1/4"=1'-0"	Project No: 06883-00	Report No: 056	Drawing No: ST-03

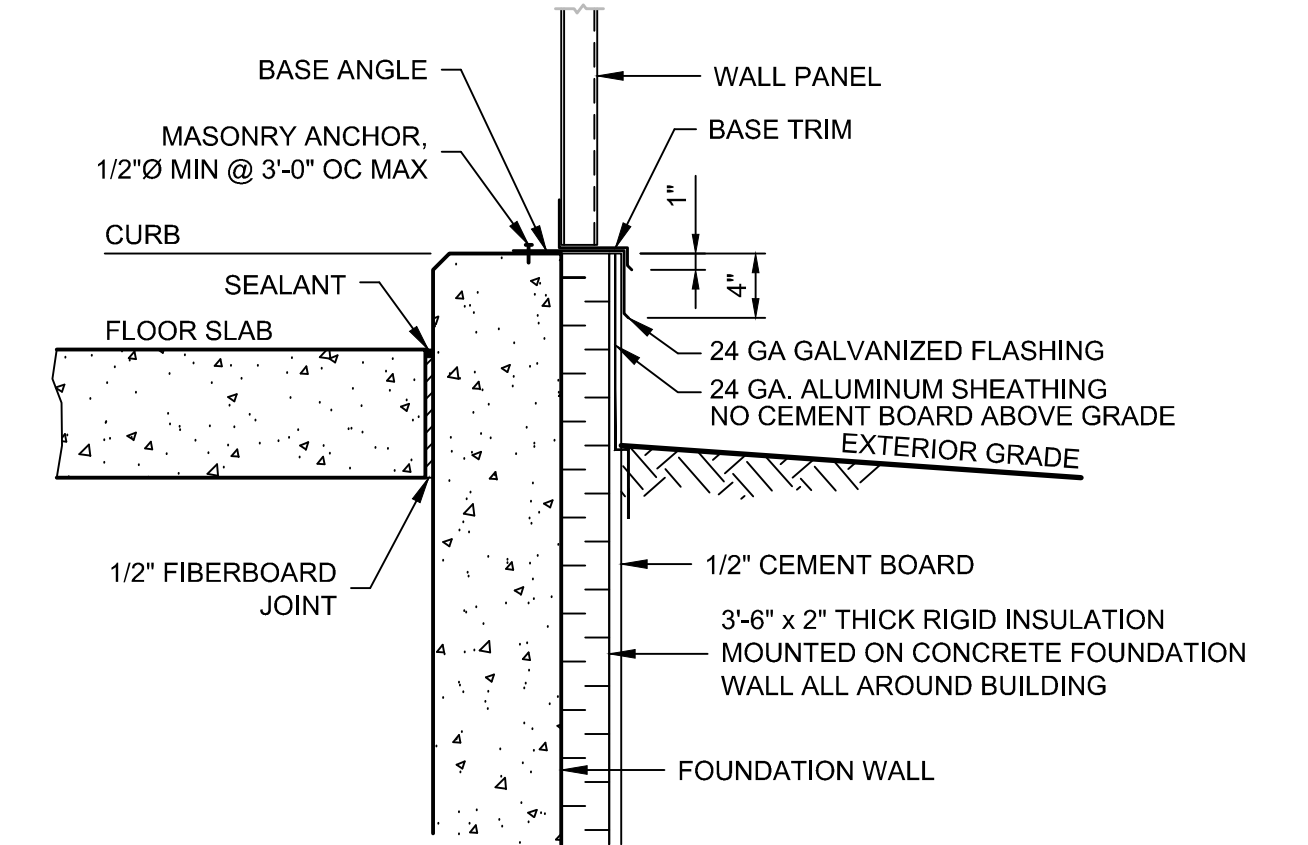


CONTRACTOR SHALL PROVIDE BUILDING EXTERIOR ELEVATION OF 114'-6" AND INTERIOR CLEARANCE AT PRIMARY RIGID FRAME OF MINIMUM 12'-8" ABOVE FLOOR SLAB EL 100'-0", WHICHEVER RESULTS IN GREATER BUILDING HEIGHT



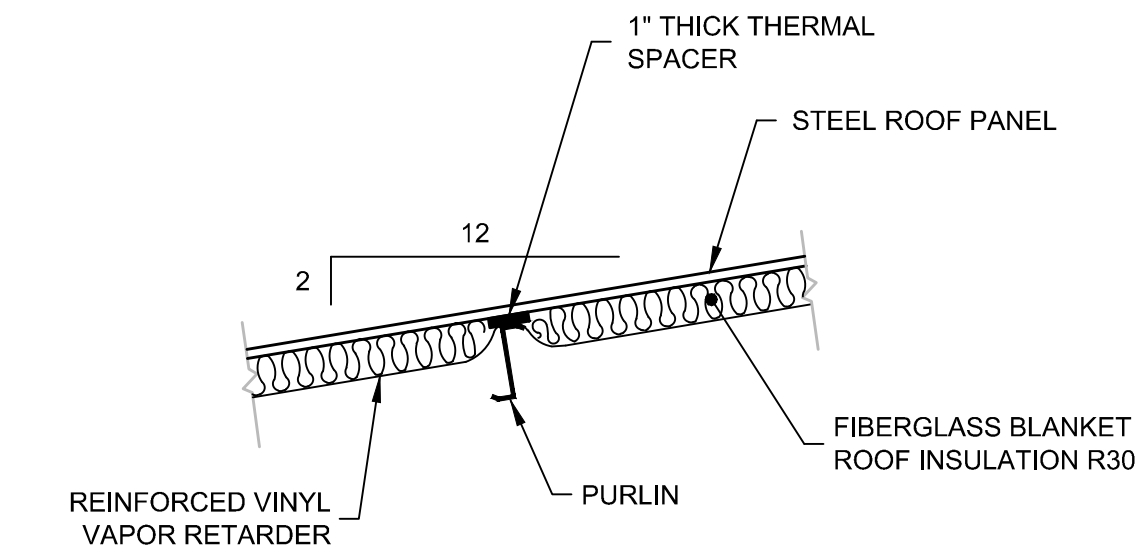
WALL INSULATION

NTS



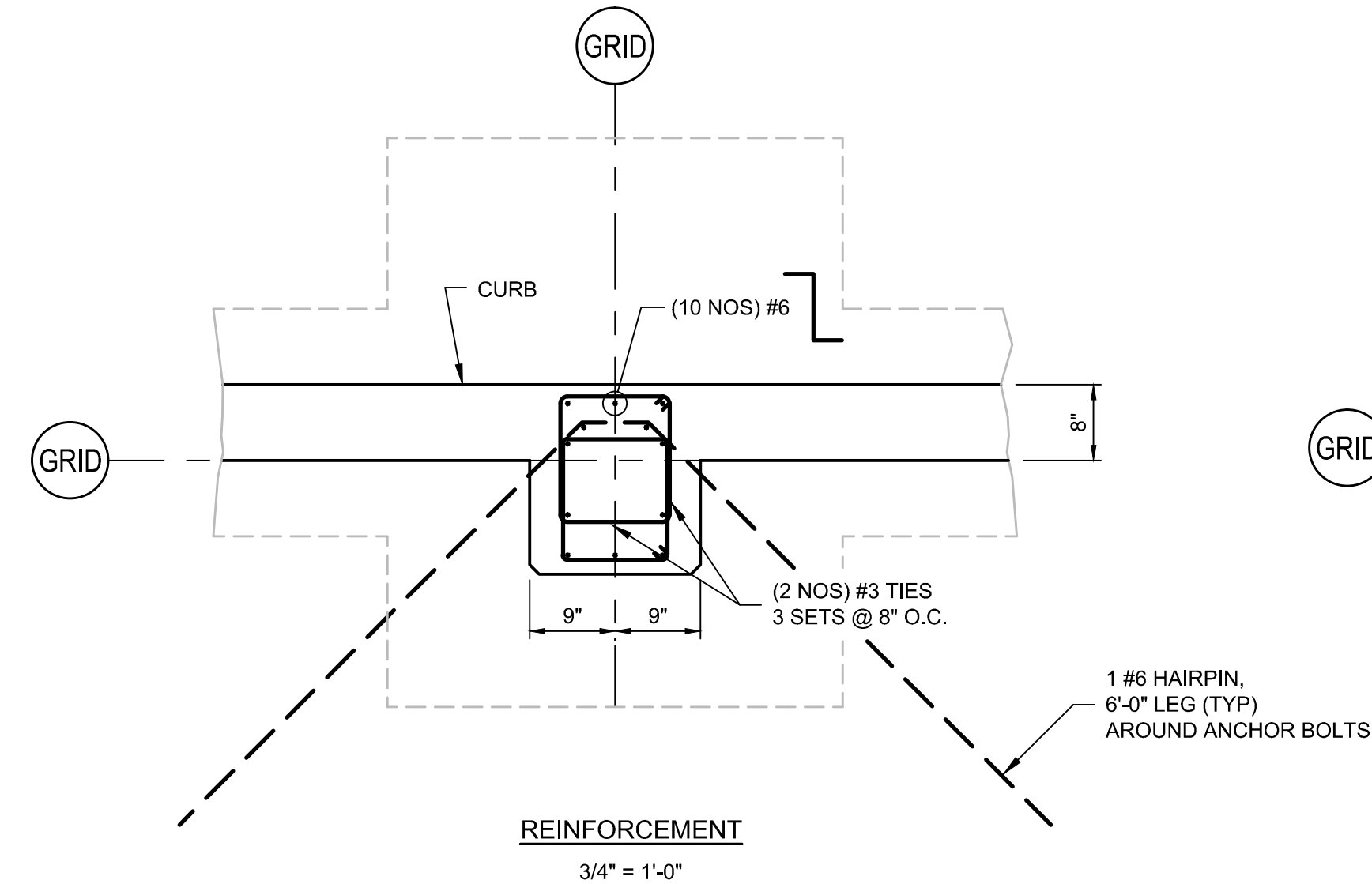
WALL BASE

NTS

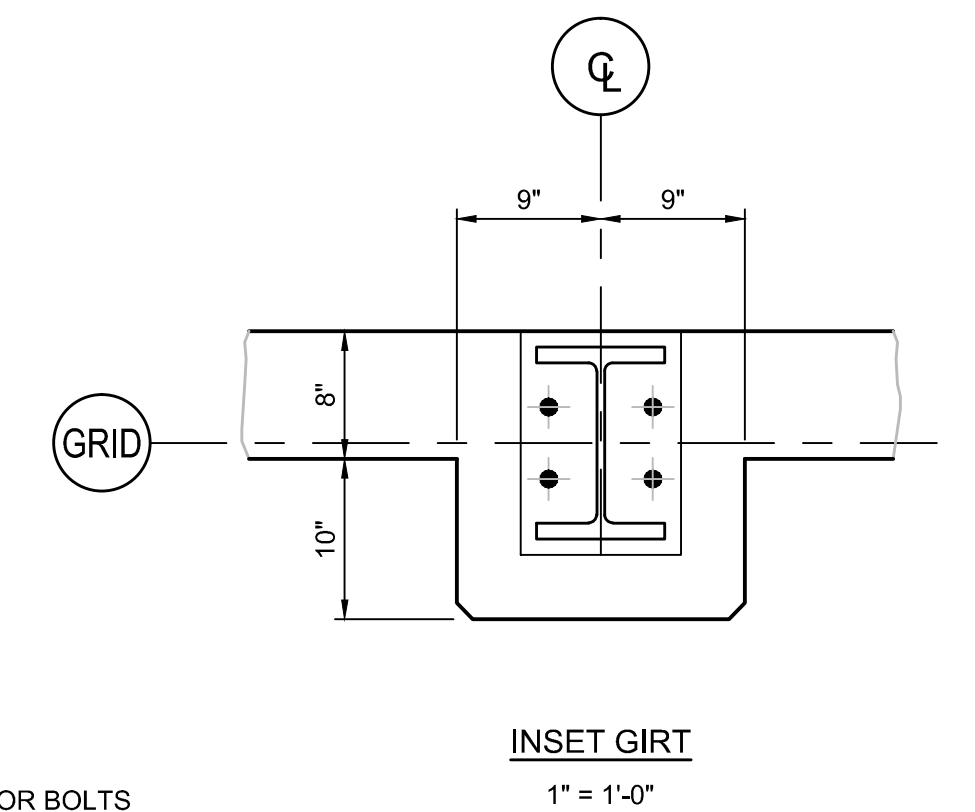


ROOF INSULATION

NTS



BUILDING COLUMN PIERS - TYPICAL



AS BUILT  
RECORD DRAWING

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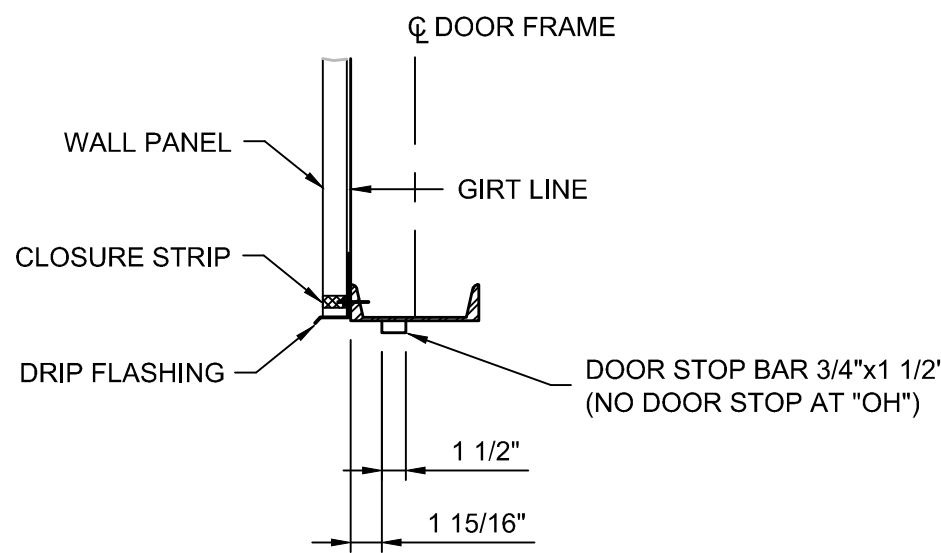
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
SECTION AND DETAILS

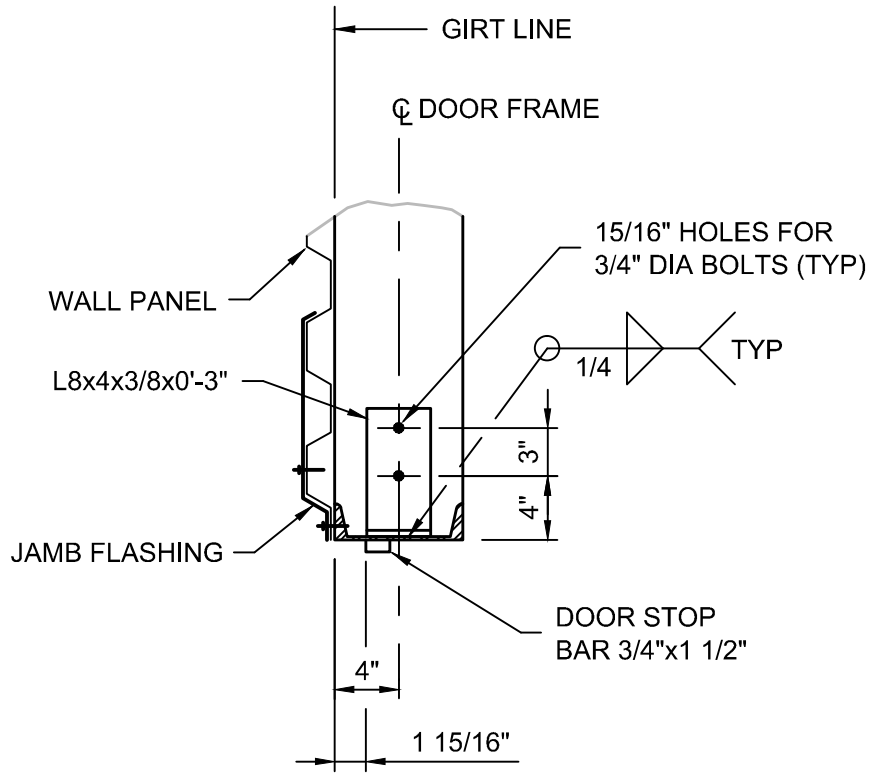


**CRA Infrastructure  
& Engineering, Inc.**

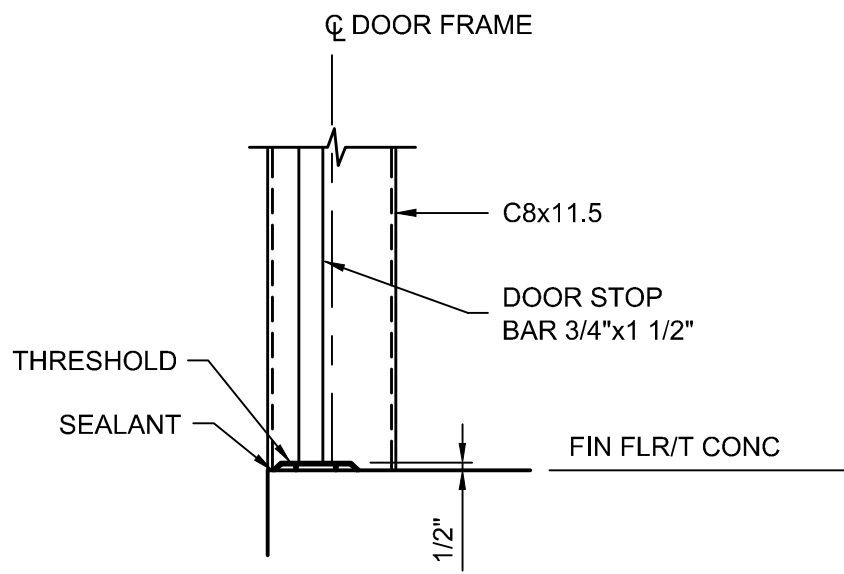
Source Reference:			Date:
			AUGUST 2012
Project Manager:	Reviewed By:	Designed By:	Drawn By:
JK	JGRW	SKM	ZM
Scale:	Project No:	Report No:	Drawing No:
AS NOTED	06883-00	056	ST-04



HEAD H-1  
1"=1'-0"

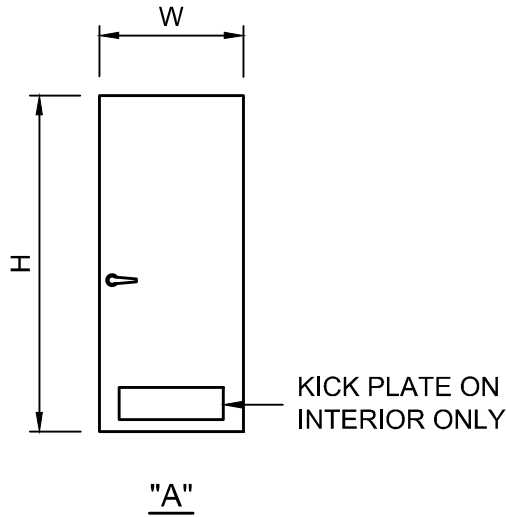


JAMB J-1  
1"=1'-0"

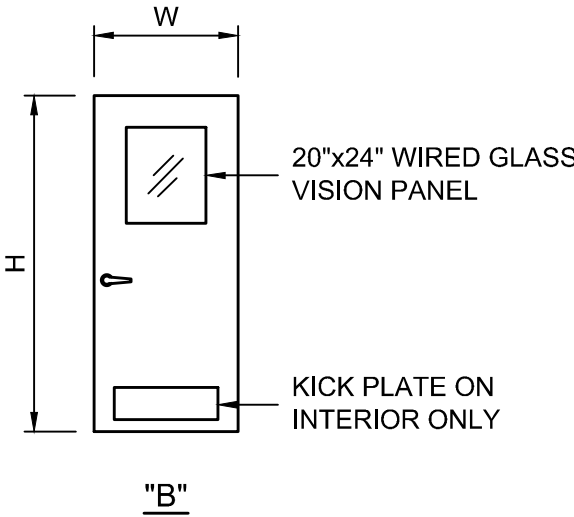


SILL S-1  
1"=1'-0"

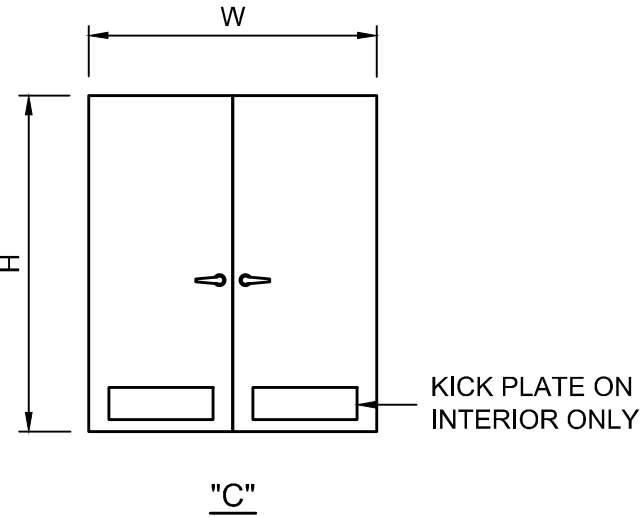
DOOR & HARDWARE SCHEDULE																									
ABBREVIATIONS: EN ALUMINUM ENAMEL FRP FIBERGLASS REINFORCED PLASTIC GHM GALVANIZED HOLLOW METAL RBR RUBBER												SFT 1/4" SAFETY GLASS - STEEL WIRED SS STAINLESS STEEL STL STRUCTURAL STEEL				<div><div><div>INTERIOR</div><div>LEFT HAND</div><div>RIGHT HAND</div><div>EXTERIOR</div></div><div><div>INTERIOR</div><div>LEFT HAND REVERSE BEVEL</div><div>RIGHT HAND REVERSE BEVEL</div><div>EXTERIOR</div></div></div>									
DOOR												FRAME					HARDWARE								REMARKS
DOOR MARK	TYPE	DOOR HAND	FIRE RATING LABELED	EXTERIOR	INTERIOR	THERMAL INSUL.	DOOR OPENING		THICKNESS	MATERIAL	GLAZING	MATERIAL	HEAD DETAIL	JAMB DETAIL	SILL DETAIL	CLOSER	DOOR STOP	HINGES	KICK PLATE	PANIC SET	THRESHOLD	WEATHERSTRIP			
							WIDTH "W"	HEIGHT "H"																	
D1	"C"	RHRB LHRB	-	X		R14.97	6'-0"	7'-0"	1 3/4"	GHM	-	STL	H-1	J-1	S-1	X	X	6	X	X	A	X	LHRB DOOR - DEAD BOLT T & B. RHRB DOOR - LATCHES & EXIT DEVICE		
D2	"B"	RHRB	3/4 HR		X	R2.44	3'-0"	7'-0"	1 3/4"	GHM	SFT	STL	-	-	-	X	X	3	X	X	B	X			
D3	"A"	RHRB	-		X	-	3'-0"	7'-0"	1 3/4"	GHM	-	STL	-	-	-	X	-	3	X	-	-	-	INTERIOR LATCH		



"A"



"B"



"C"

DOOR TYPES  
1/4" = 1'-0"

DOOR AND HARDWARE NOTE

ALL DOORS AND HARDWARE SHALL BE AS SPECIFIED OR APPROVED EQUAL, AND SHALL CONFORM TO CODE REQUIREMENTS FOR ACCESSIBILITY.

DOORS

- EXTERIOR DOORS SHALL BE "IMPERIAL" BY CECO DOOR PRODUCTS, 16 GAUGE, POLYURETHANE CORE, GALVANIZED AND PAINTED.
- INTERIOR DOORS SHALL BE "REGENT" BY CECO DOOR PRODUCTS, 18 GAUGE, HONEYCOMB CORE, GALVANIZED AND PAINTED.

HARDWARE (MANUFACTURER'S STANDARD)

- CLOSER: 1250 SERIES ALUMINUM ENAMEL (EN) - "SARGENT".
- DOOR STOP: TRI BASE FLOOR STOP #259F-US26D - "HAGER".
- HINGES: FULL MORTISE STAINLESS STEEL 32D, 4 1/2"x4 1/2"x0.134 GAUGE, #BB1191 - "HAGER".
- KICK PLATE: STAINLESS STEEL 32D, 16 GAUGE, 8"x26", #220S - "HAGER".
- PANIC SET:
  - EXIT DEVICE: #12-9913-ETF, US 32D FIRE RATED - "SARGENT"; EXTERIOR DOOR BY BUTLER.
  - PUSH PLATE: STAINLESS STEEL 32D, 3"x12", #30S - "HAGER".
  - PULL PLATE: STAINLESS STEEL 32D, 3"x12", #32G - "HAGER".
  - LOCKS: MORTISE - "SARGENT".
- THRESHOLD:
  - SKID RESISTANT ABRASIVE CAST ALUMINUM HEAVY DUTY, 4" WIDE, #624S - "HAGER".
  - NON-SLIP ABRASIVE ALUMINUM SADDLE, 4" WIDE, #410S - "HAGER".
- WEATHERSTRIP AND DOOR BOTTOM:
  - WEATHERSTRIP JAMB & HEAD #870S-N - "HAGER".
  - DOOR BOTTOM #774S-V - "HAGER".

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	ZM
No	Revision	Date	Initial

Approved

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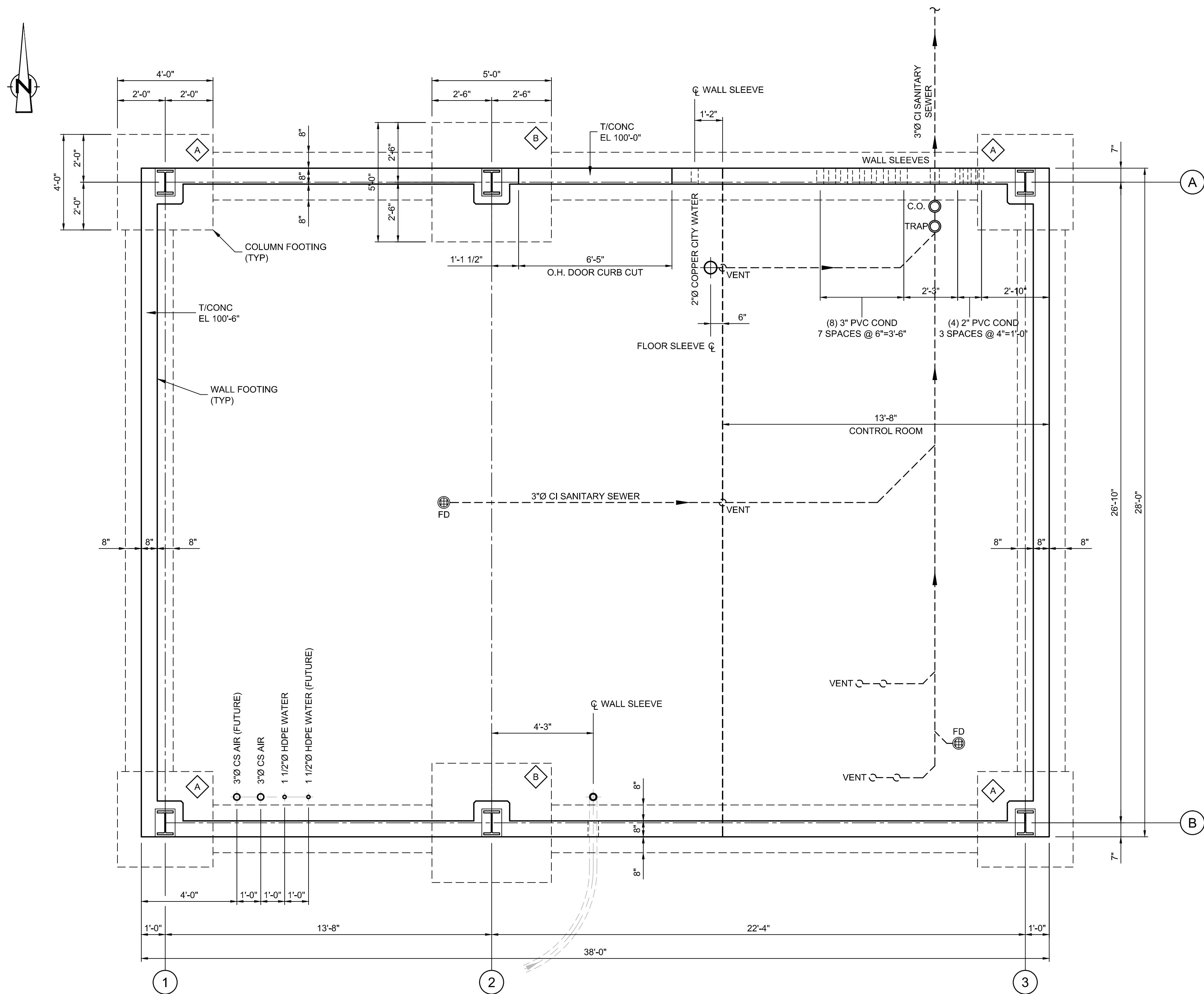
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
SCHEDULE & DETAILS



CRA Infrastructure  
& Engineering, Inc.

Source Reference:			Date: AUGUST 2012
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: AS NOTED	Project No: 06883-00	Report No: 056	Drawing No: ST-05

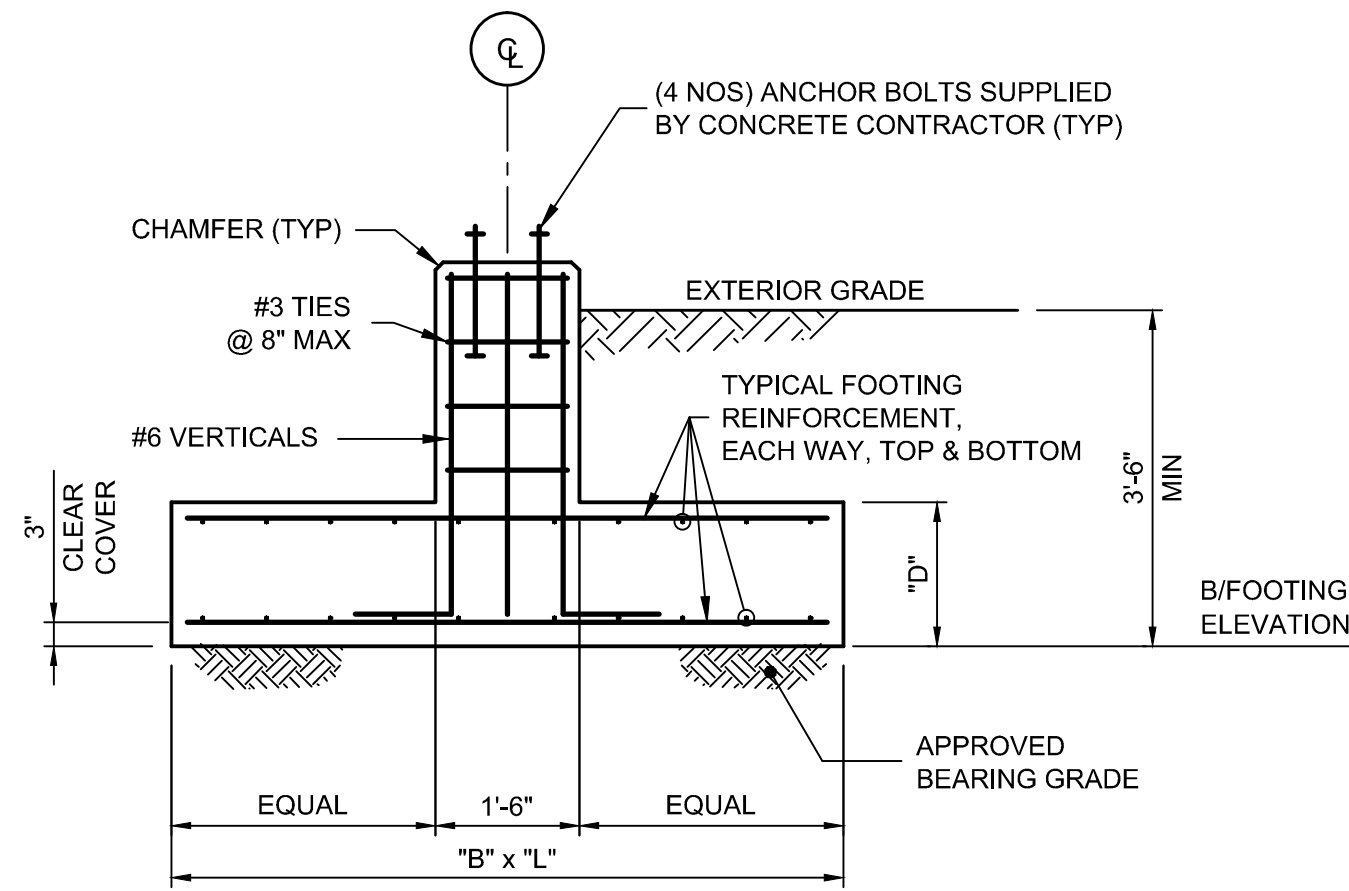


FOUNDATION PLAN  
3/8" = 1'-0"

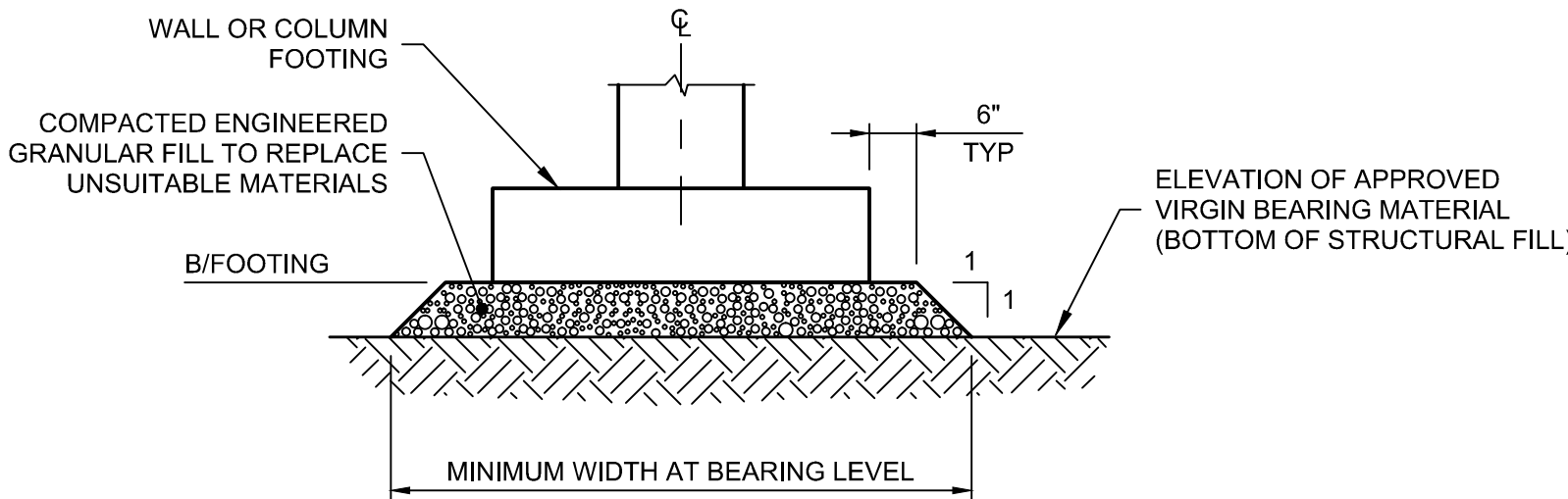
COLUMN FOOTING SCHEDULE								
FOOTING MARK	DIMENSIONS			REINFORCEMENT				NOTES
	"B" (EAST-WEST)	"L" (NORTH-SOUTH)	"D"	BOTTOM (EAST-WEST)	BOTTOM (NORTH-SOUTH)	TOP (EAST-WEST)	TOP (NORTH-SOUTH)	
A	4'-0"	4'-0"	1'-6"	7 #7	7 #7	5 #3	5 #3	-
B	5'-0"	5'-0"	1'-6"	7 #7	7 #7	5 #3	5 #3	-

NOTES

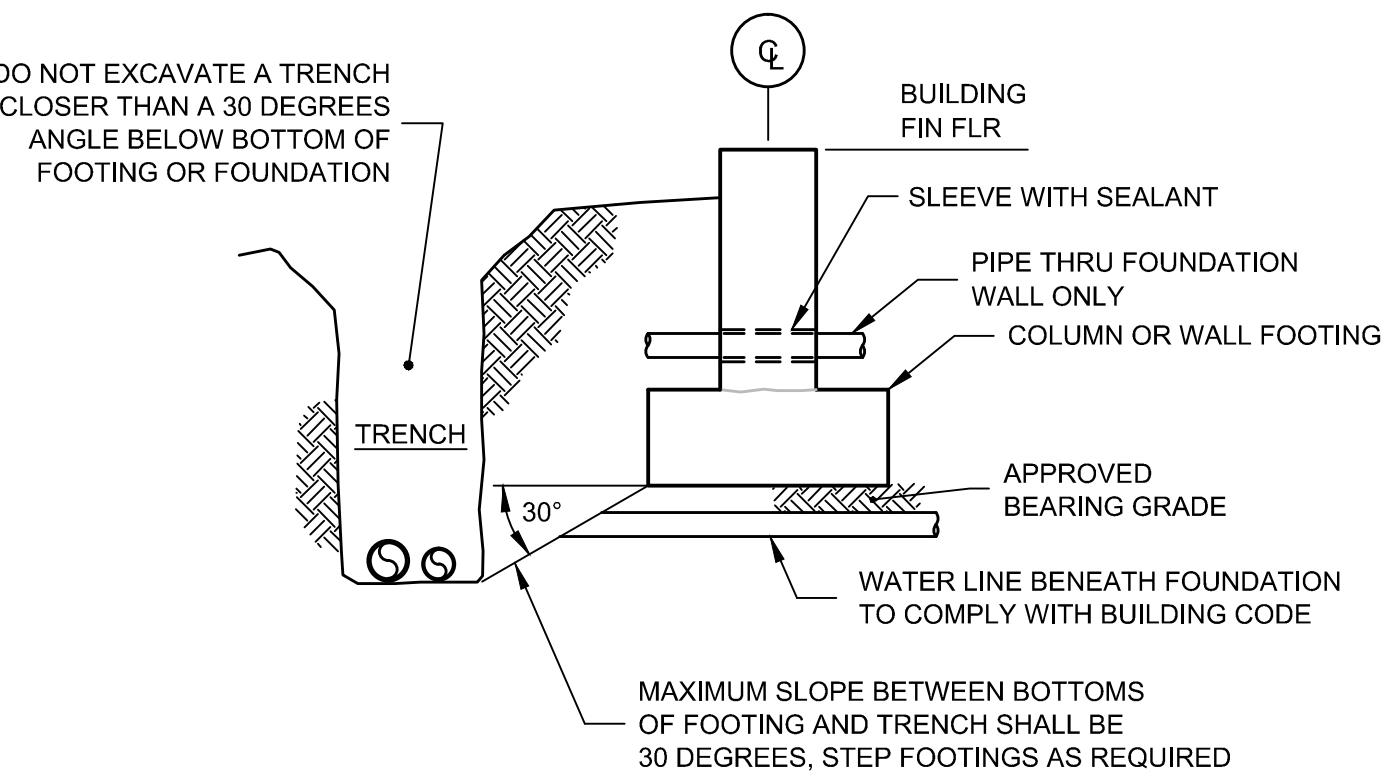
- FOOTING SIZES AND DETAILS SHOWN ON VARIOUS DRAWINGS ARE BASED ON BUTLER MANUFACTURING COMPANY INFORMATION PROVIDED TO CRAIE.
- FOOTING SIZES, DETAILS AND DESIGN SHALL BE VERIFIED/MODIFIED BASED ON ACTUAL PRE-ENGINEERED BUILDING LOADS PROVIDED BY MANUFACTURER PRIOR TO ORDERING MATERIALS FOR CONSTRUCTION.
- FOR ANCHOR BOLT AND BUILDING COLUMN LAYOUT DETAILS REFER TO DRAWINGS BY PRE-ENGINEERED BUILDING MANUFACTURER.
- BUILDING COLUMN FOUNDATION ANCHORS LAYOUT, NUMBER, TYPE, DIAMETER, LENGTH, EMBEDMENT DEPTH, AND OTHER DETAILS SHALL BE BASED ON BUILDING MANUFACTURER'S REQUIREMENTS AND LOADINGS. THE ANCHORS SHALL BE INSTALLED PER ITS MANUFACTURER'S RECOMMENDATIONS.
- CONTINUE WALL HORIZONTAL AND VERTICAL REINFORCEMENTS INTO COLUMN PIERS AND FOUNDATIONS, RESPECTIVELY.
- PROVIDE TYPICAL PIER REINFORCEMENTS FOR ALL BUILDING COLUMNS.



COLUMN FOOTING DETAIL  
NTS



FILL BENEATH FOUNDATION  
NTS



TRENCH NEAR FOOTING  
NTS

AS BUILT  
RECORD DRAWING

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No	Revision	Date	Initial
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BIOSPARGE TREATMENT SYSTEM

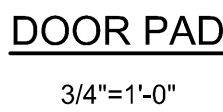
CONTROL BUILDING  
FOUNDATION PLAN



CRA Infrastructure  
& Engineering, Inc.

Source Reference:			Date:
			AUGUST 2012
Project Manager:	Reviewed By:	Designed By:	Drawn By:
JK	JGRW	SKM	ZM
Scale:	Project No:	Report No:	Drawing No:
3/8" = 1'-0"	06883-00	056	ST-06

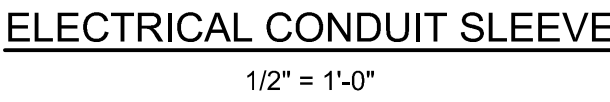
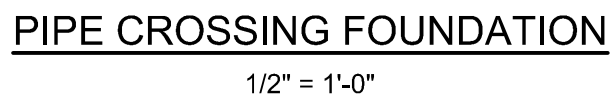




The diagram shows a rectangular equipment pad with rounded corners. The overall width is labeled "B" and the overall height is labeled "A". A detail callout points to the corner, labeled "CHAMFER (TYP)". Two circular markers with the number "1" and arrows pointing left are positioned above and below the pad, indicating a specific orientation or reference point.



1. HILTI ANCHOR BOLTS SHALL CONSIST OF HVA ANCHORING SYSTEM (HVA ADHESIVE AND HAS STAINLESS STEEL ROD) WITH SPECIFIED BOLT DIAMETER AND MINIMUM CONCRETE EMBEDMENT.
2. HILTI ANCHORS SHALL BE SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR.
3. LAYOUT, SIZE AND NUMBER OF ANCHORS SHALL BE AS PER MECHANICAL REQUIREMENTS.



**AS BUILT  
RECORD DRAWING**



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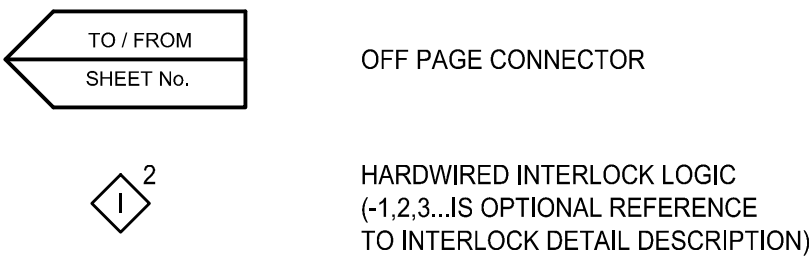
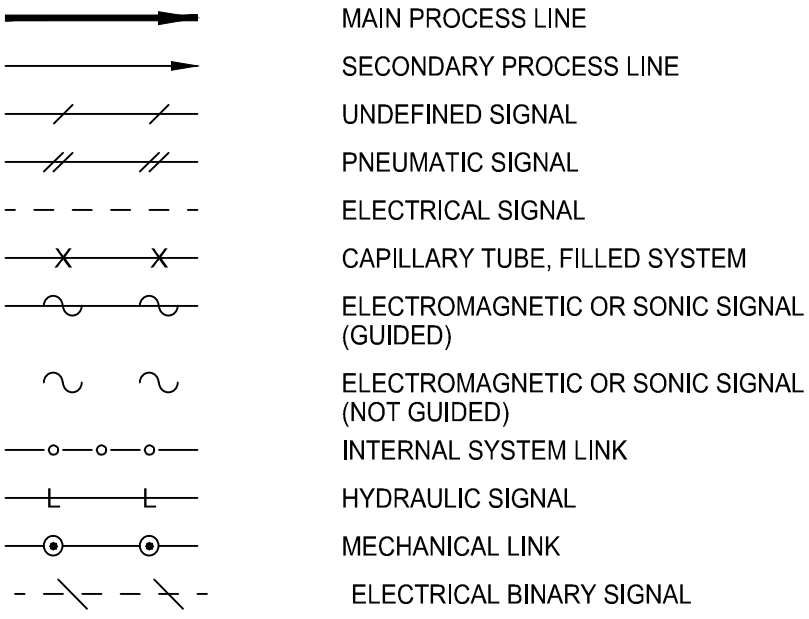
## CONTROL BUILDING MISCELLANEOUS DETAILS



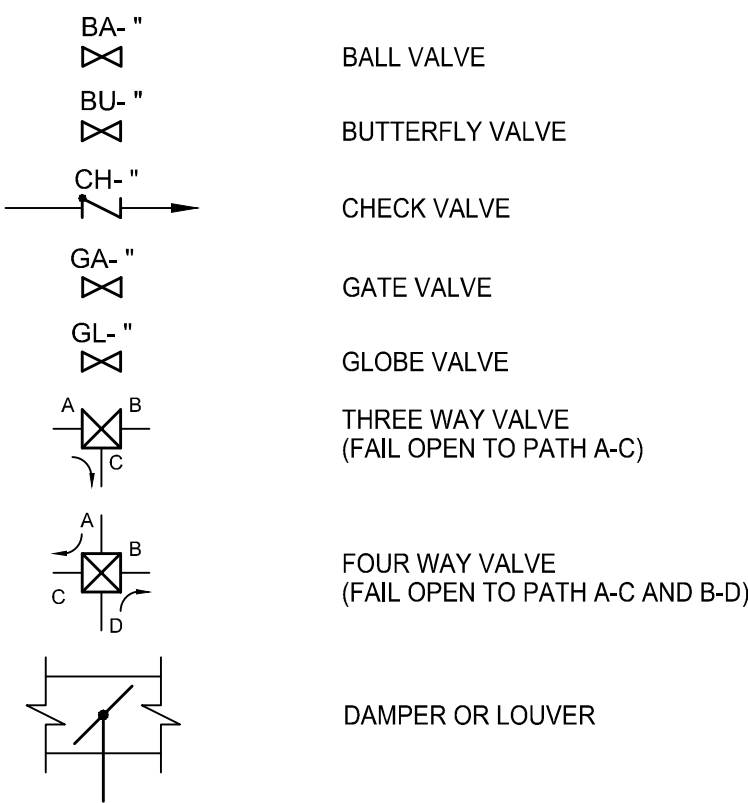
Source Reference:			Date: AUGUST 2012
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: AS NOTED	Project No: 06883-00	Report No: 056	Drawing No: ST-07



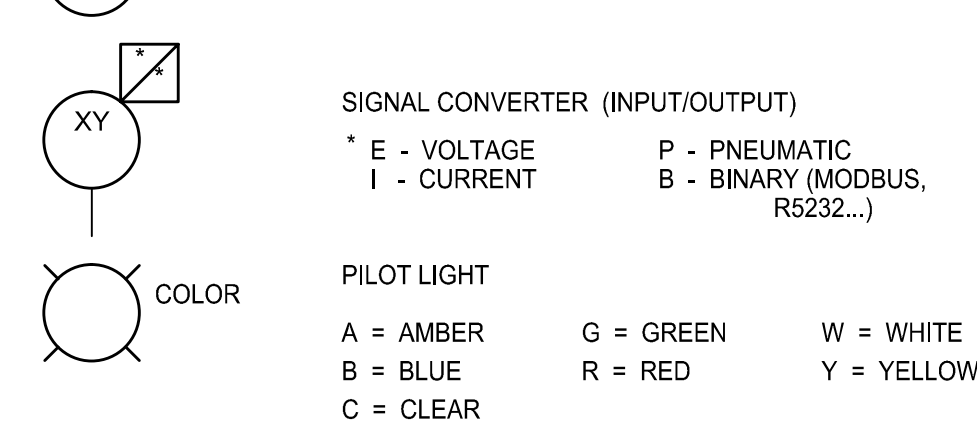
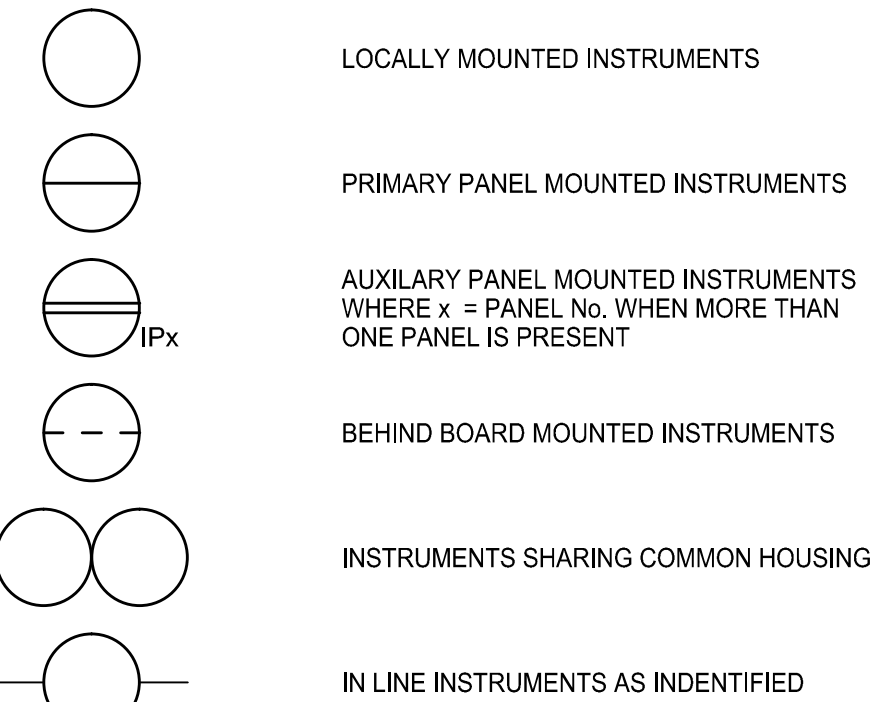
PROCESS / INSTRUMENT LINES



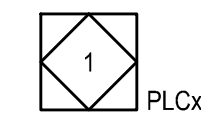
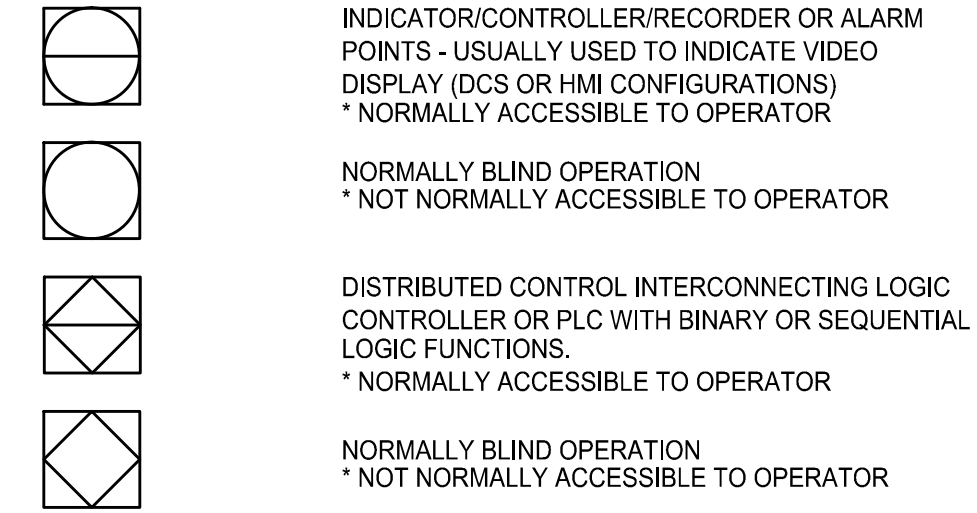
VALVE SYMBOLS



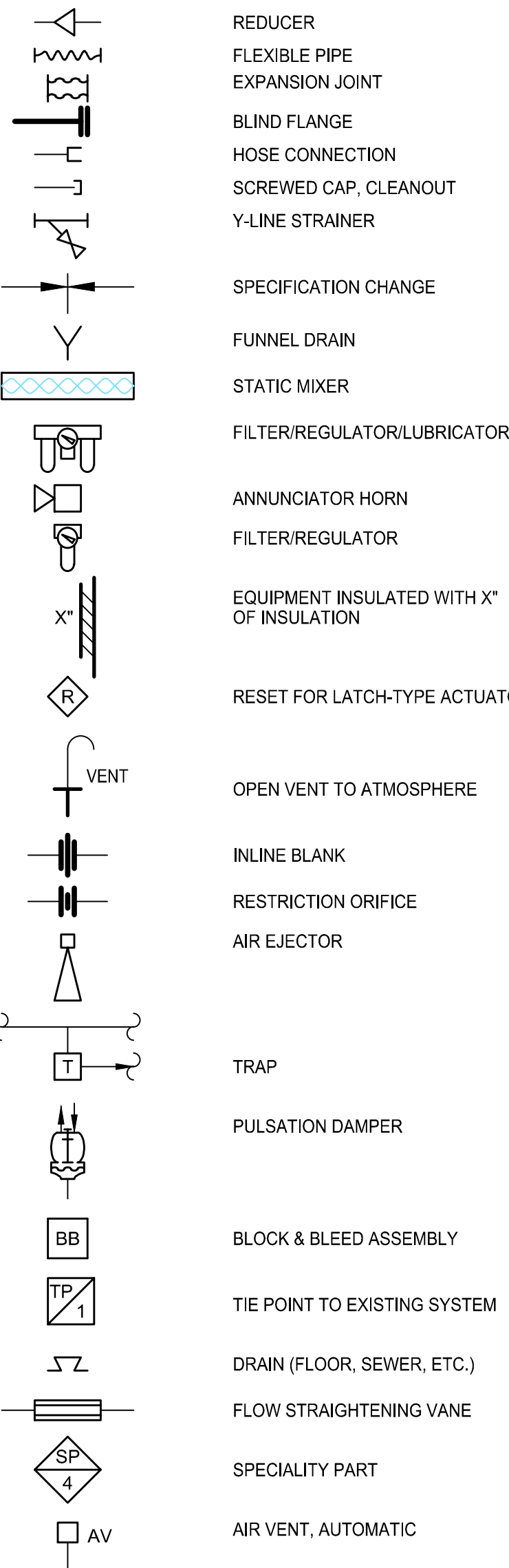
GENERAL INSTRUMENT SYMBOLS



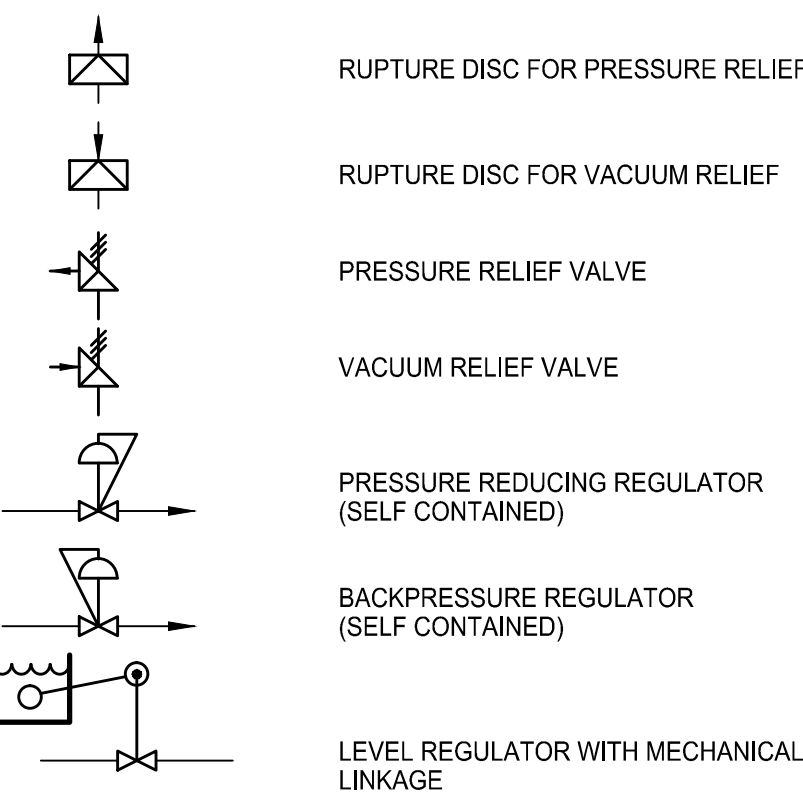
DISTRIBUTED CONTROL / SHARED DISPLAY INSTRUMENTS



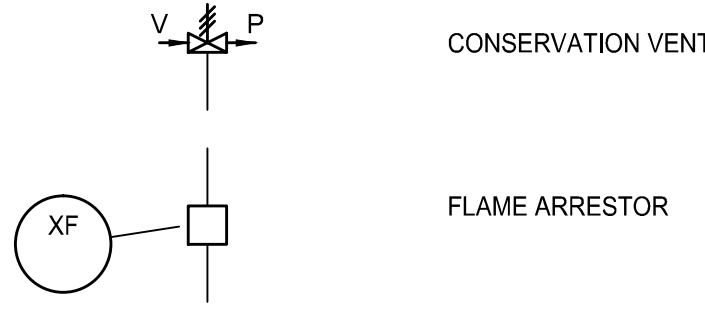
MISCELLANEOUS SYMBOLS



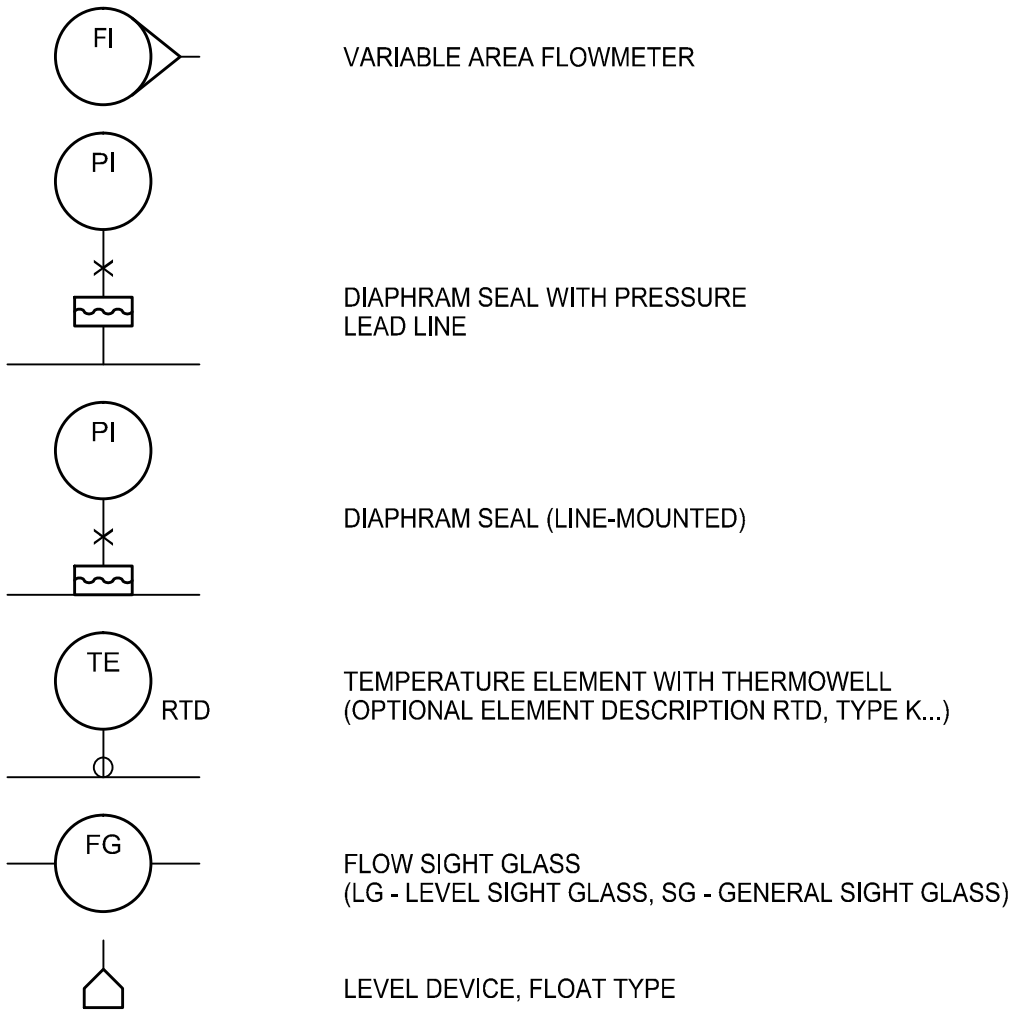
SELF-ACTUATED REGULATORS, VALVES, AND OTHER DEVICES



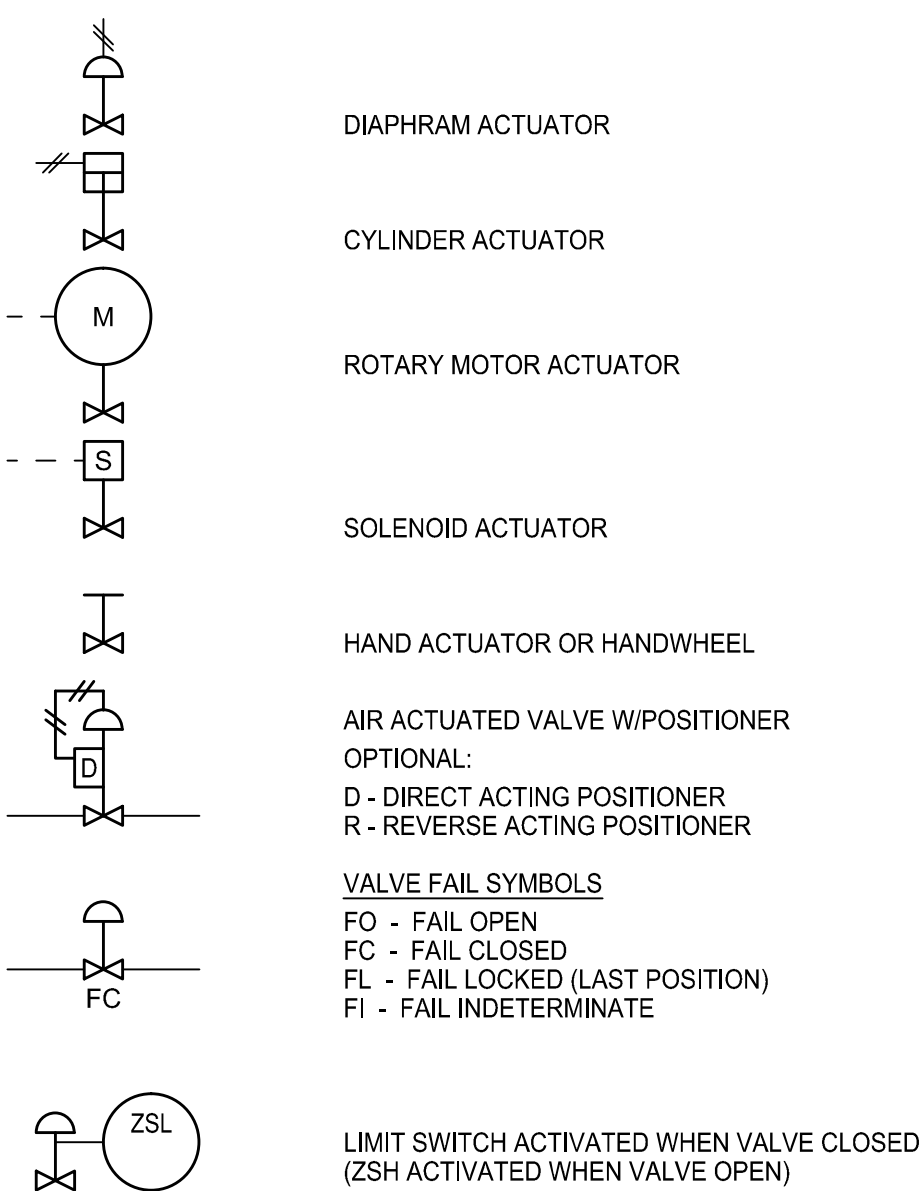
INTERLOCK LOGIC IN CONTROLLER OR PLC WHERE:  
- 1,2,3... IS OPTIONAL REFERENCE TO INTERLOCK DETAIL DESCRIPTION  
- x = PLC No. WHEN MORE THAN ONE PLC IS PRESENT IN THE SYSTEM



PRIMARY ELEMENT SYMBOLS



ACTUATOR SYMBOLS



ABBREVIATIONS:

POWER SUPPLY OR PURGE FLUID TYPES

AS - AIR SUPPLY  
IA - INSTRUMENT AIR  
PA - PLANT AIR  
ES - ELECTRICAL SUPPLY  
GS - GAS SUPPLY  
HS - HYDRAULIC SUPPLY  
NS - NITROGEN SUPPLY  
SS - STEAM SUPPLY  
WS - WATER SUPPLY

THE SUPPLY LEVEL MAY BE ADDED TO THE INSTRUMENT SUPPLY LINE, E.G., AG-100, A 100-PSI AIR SUPPLY; ES-24DC, A 24-VOLT DIRECT CURRENT POWER SUPPLY.

INSTRUMENTS:

HOA - HAND/OFF/AUTO  
LOR - LOCAL/OFF/REMOTE  
OPN - OPEN  
CLS - CLOSE  
SP - SETPOINT

TYPICAL ISA LETTER COMBINATIONS

First-Letters	Initiating or Measured Variable	Controllers			Readout Devices	Switches and Alarm Devices *			Transmitters			Solenoids, Relays, Computing Devices	Primary Element	Test Point	Well or Probe	Viewing Device, Glass	Safety Device	Final Element
		Recording	Indicating	Blind		High **	Low	Comb	Recording	Indicating	Blind							
A	Analysis	ARC	AIC	AC	AR	AI	ASH	ASL	ASHL	ART	AIT	AT	AY	AE	AP	AW	BG	AV
B	Burner/Combustion	BRC	BIC	BC	BR	BI	BSH	BSL	BSHL	BRT	BIT	BT	BY	BE		BW		BZ
C	User's Choice																	
D	User's Choice																	
E	Voltage	ERC	EIC	EC	ER	EI	ESH	ESL	ESHL	ERT	EIT	ET	EY	EE				EZ
F	Flow Rate	FRC	FIC	FC	FR	FI	FSH	FSL	FSHL	FRT	FIT	FT	FY	FE	FP	FG		FV
FQ	Flow Quantity	FQRC	FQIC		FQR	FQI	FQSH	FQSL			FQIT	FQT	FQY	FQE				FQV
FF	Flow Ratio	FFRC	FFIC	FFC	FFR	FFI	FFSH	FFSL						FE				FFV
G	User's Choice																	
H	Hand		HIC	HC					HS									HV
I	Current	IRC	IIC		IR	II	ISH	ISL	ISHL	IRT	IIT	IT	IY	IE				IZ
J	Power	JRC	JIC		JR	JI	JSH	JSL	JSHL	JRT	JIT	JT	JY	JE				JV
K	Time	KRC	KIC	KC	KR	KI	KSH	KSL	KSHL	KRT	KIT	KT	KY	KE				KV
L	Level	LRC	LIC	LC	LR	LI	LSH	LSL	LSHL	LRT	LIT	LT	LY	LE		LW	LG	LV
M	User's Choice																	
N	User's Choice																	
O	User's Choice																	
P	Pressure/Vacuum	PRC	PIC	PC	PR	PI	PSH	PSL	PSHL	PRT	PIT	PT	PY	PE	PP		PSV, PSE	PV
PD	Pressure, Differential	PDRC	PDIC	PDC	PDR	PDI	PDSH	PDSL		PDRT	PDIT	PDT	PDY	PE	PP			PDV
Q	Quantity	QRC	QIC		QR	QI	QSH	QSL	QSHL	QRT	QIT	QT	QY	QE				QZ
R	Radiation	RRC	RIC	RC	RR	RI	RSH	RSL	RSHL	RRT	RI	RT	RY	RE		RW		RZ
S	Speed/Frequency	SRC	SIC	SC	SR	SI	SSH	SSL	SSHL	SRT	SIT	ST	SY	SE				SV
T	Temperature	TRC	TIC	TC	TR	TI	TSH	TSL	TSHL	TRT	TIT	TT	TY	TE	TP	TW	TSE	TV
TD	Temperature, Differential	TDRC	TDIC	TDC	TDR	TDI	TDSH	TDSL		TDRT	TDIT	TDT	TDY	TE	TP	TW		TDV
U	Multivariable				UR	UI							UY					UV
V	Vibration/Machinery Analysis				VR	VI	VSH	VSL	VSHL	VRT	VIT	VT	VY	VE				VZ
W	Weight/Force	WRC	WIC	WC	WR	WI	WSH	WSL	WSHL	WRT	WIT	WT	WY	WE				WZ
WD	Weight/Force, Differential	WDRC	WDIC	WDC	WDR	WDI	WDSH	WDSL		WDRT	WDIT	WDT	WDY	WE				WDZ
X	Unclassified																	
Y	Event/State/Presence		YIC	YC	YR	YI	YSH	YSL				YT	YY	YE				YZ
Z	Position/Dimension	ZRC	ZIC	ZC	ZR	ZI	ZSH	ZSL	ZSHL	ZRT	ZIT	ZT	ZY	ZE				ZV
ZD	Gauging/Deviation	ZDRC	ZDIC	ZDC	ZDR	ZDI	ZDSH	ZDSL		ZDRT	ZDIT	ZDT	ZDY	ZDE				ZDV

Note: This table is not all-inclusive.  
\* A, alarm, the annunciating device, may be used in the same fashion as S, switch, the actuating device.  
\*\* The letters H and L may be omitted in the undefined case.

Other Possible Combinations:  
FO (Restriction Orifice)  
FRK, HK (Control Stations)  
LLH (Level Light High)  
LCH (Level Control High)  
KQI (Running Time Indicator)  
HMS (Hand Momentary Switch)  
LCL (Level Control Low)

IDENTIFICATION LETTERS

FIRST-LETTER		SUCCEEDING-LETTERS		
MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A Analysis		Alarm		
B Burner/Combustion		User's Choice	User's Choice	User's Choice
C User's Choice			Control	
D User's Choice	Differential			
E Voltage		Sensor (Primary Element)		
F Flow Rate	Ratio (Fraction)			
G User's Choice		Glass, Viewing Device		High
H Hand		Indicate		
I Current (Electrical)				
J Power	Scan			
K Time, Time Schedule	Time Rate of Change		Control Station	
L Level		Light		Low
M User's Choice	Momentary			Middle, Intermediate
N User's Choice		User's Choice	User's Choice	User's Choice
O User's Choice		Orifice, Restriction		
P Pressure, Vacuum		Point (Test) Connection		
Q Quantity				
R Radiation		Record		
S Speed, Frequency	Safety		Switch	
T Temperature			Transmit	
U Multivariable		Multifunction	Multifunction	Multifunction
V Vibration, Machinery Analysis			Valve, Damper, Louver	
W Weight, Force		Well		
X Unclassified	X Axis	Unclassified		Unclassified
Y Event, State, or Presence	Y Axis		Relay, Compute, Convert	
Z Position, Dimension	Z Axis		Driver, Actuator, Unclassified Final Control Element	

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

Approved

HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

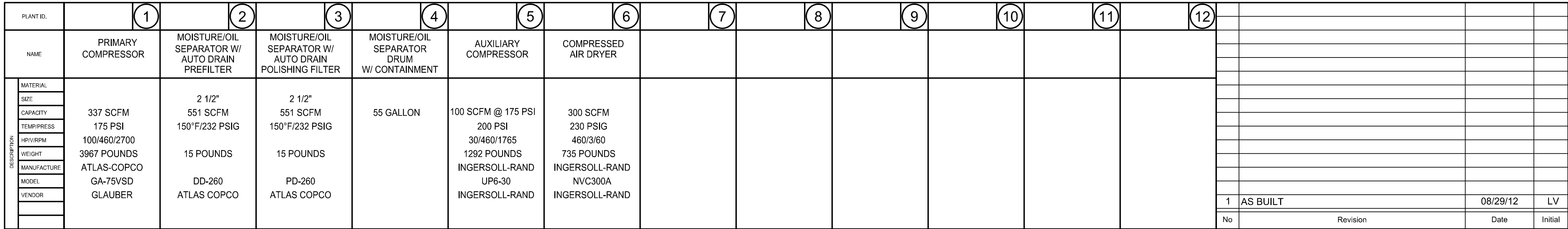
BIOSPAGE TREATMENT SYSTEM

ENGINEERING FLOW SHEET  
LEGEND



CRA Infrastructure  
& Engineering, Inc.

Source Reference:		Date:	
		7-23-03	
Project Manager:	Reviewed By:	Designed By:	Drawn By:
J. KAY			B.A. BEEBE
Scale:	Project No:	Report No:	Drawing No:
	06883-00	056	EF-00



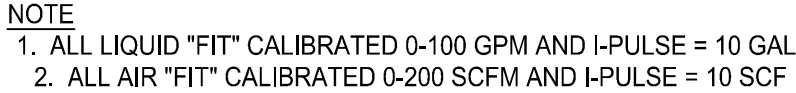
Scale:	Project No:	Report No:	Drawing No:
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## ENGINEERING FLOW SHEET

### PROCESS EQUIPMENT







HOOKER/RUCO SITE HICKSVILLE, NEW YORK
BIOSPARGE TREATMENT SYSTEM
ENGINEERING FLOW SHEET MIDDLE FENCE INJECTION WELLS

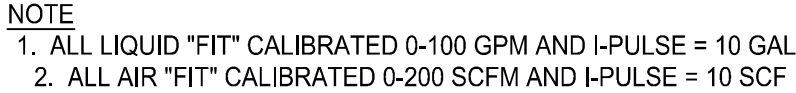


**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:			Date: SEPTEMBER 2003
Project Manager: J. KAY	Reviewed By:	Designed By: B.A. BEEBE	Drawn By: B.A. BEEBE
Scale:	Project No: 06883-00	Report No: 056	Drawing No: EF-02







**AS BUILT  
RECORD DRAWING**

## ENGINEERING FLOW SHEET

### MIDDLE FENCE INJECTION WELLS



# CRA Infrastructure & Engineering, Inc.

Source Reference

Project Manager  
J. KAY

**Scale:**

Reviewed By:

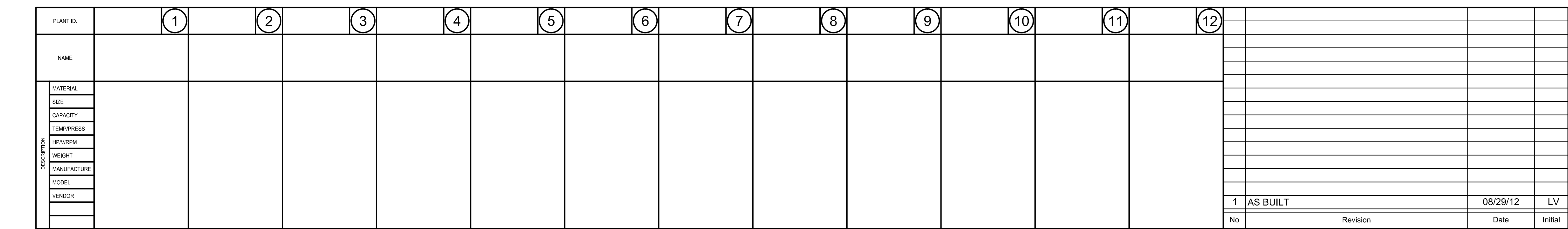
Project No:

	Date: SEPTEMBER 2003
--	-------------------------

Designed By:	Drawn By:
B.A. BEEBE	B.A. BEEBE

Report No:	Drawing No:
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16883-00(056)EF-BU000 SEP 26/2012



**AS BUILT  
RECORD DRAWING**

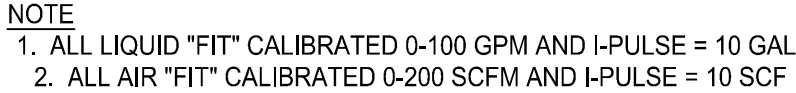
**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:			Date: SEPTEMBER 2003
Project Manager: J. KAY	Reviewed By:	Designed By: B.A. BEEBE	Drawn By: B.A. BEEBE
Scale:	Project No: 06883-00	Report No: 056	Drawing No: EF-05







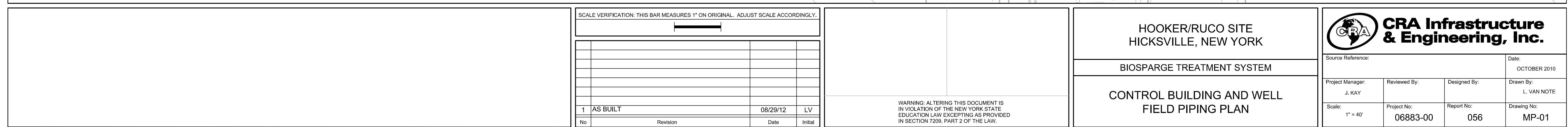


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Project Manager: J. KAY	Reviewed By:	Designed By: B.A. BEEBE	Drawn By: B.A. BEEBE
Scale:	Project No: 06883-00	Report No: 056	Drawing No: EF-08

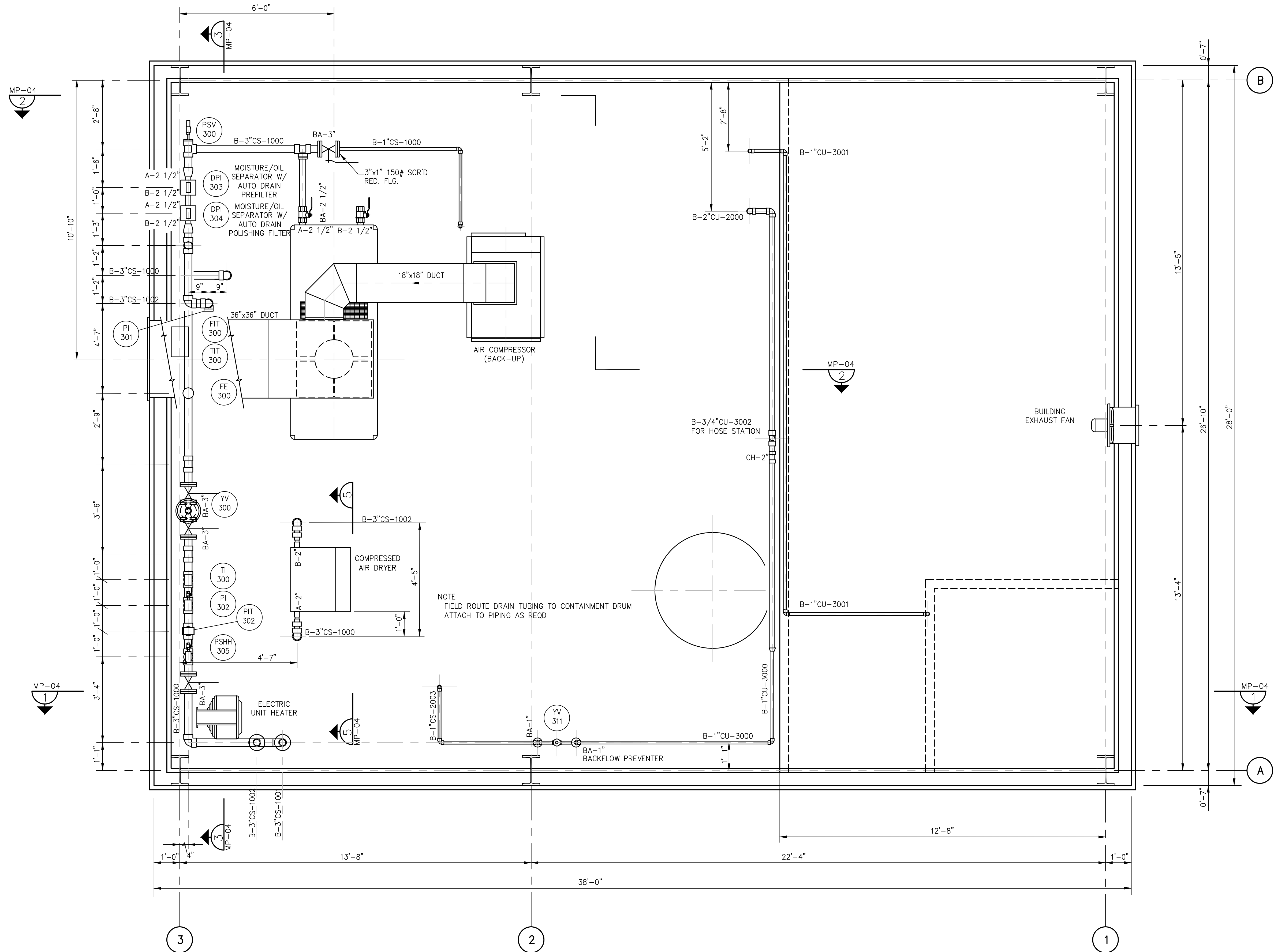
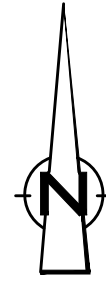
# ENGINEERING FLOW SHEET

## NORTH FENCE INJECTION WELLS









AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

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EDUCATION LAW EXCEPTING AS PROVIDED  
IN SECTION 7209, PART 2 OF THE LAW.

HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
EQUIPMENT LAYOUT (UPPER)



**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:			Date:
			7-23-03
Project Manager:	Reviewed By:	Designed By:	Drawn By:
J. KAY		B. A. BEEBE	B. A. BEEBE
Scale:	Project No:	Report No:	Drawing No:
1/2" = 1'-0"	06883-00	056	MP-03

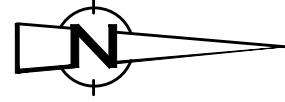




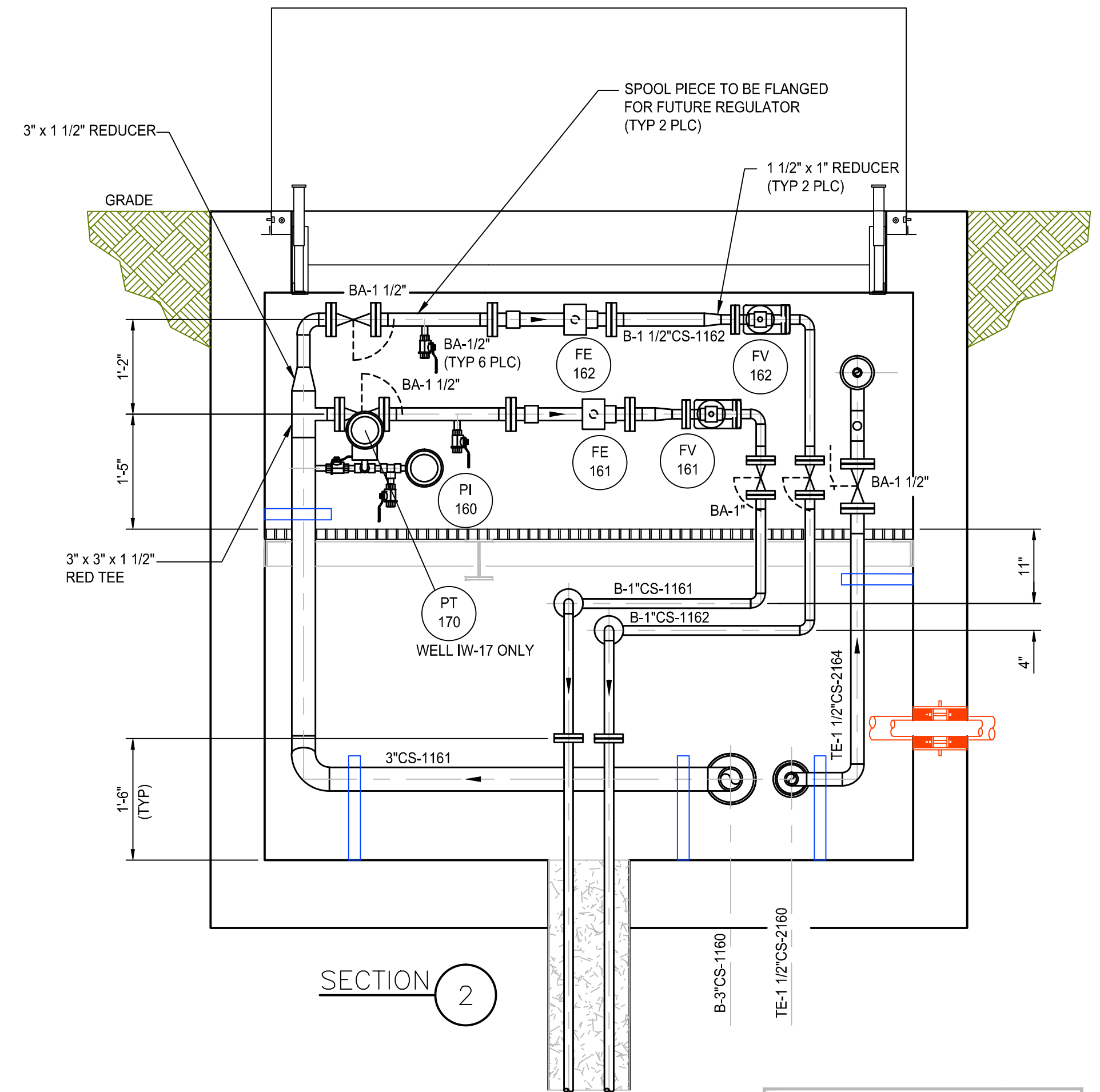
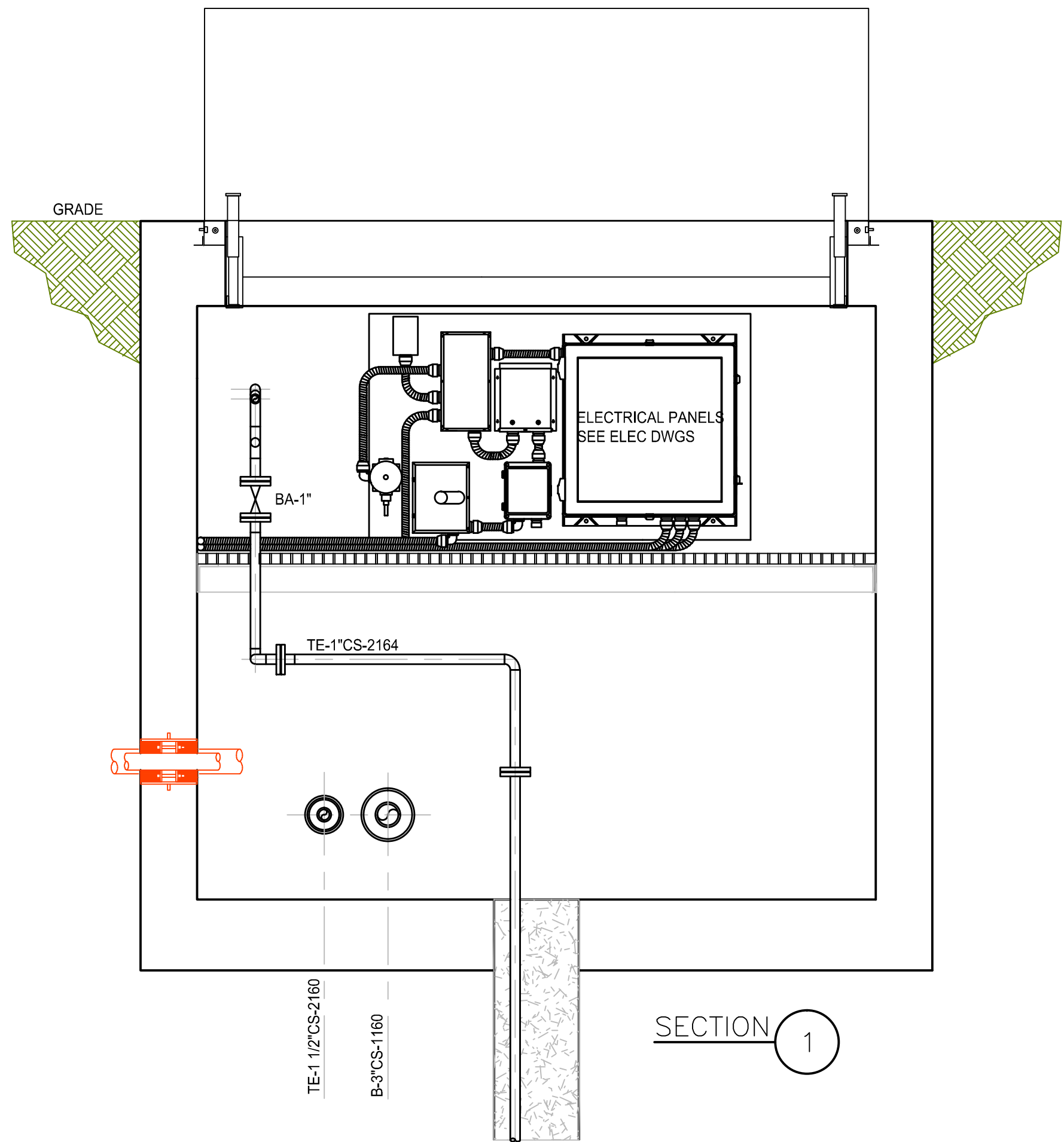
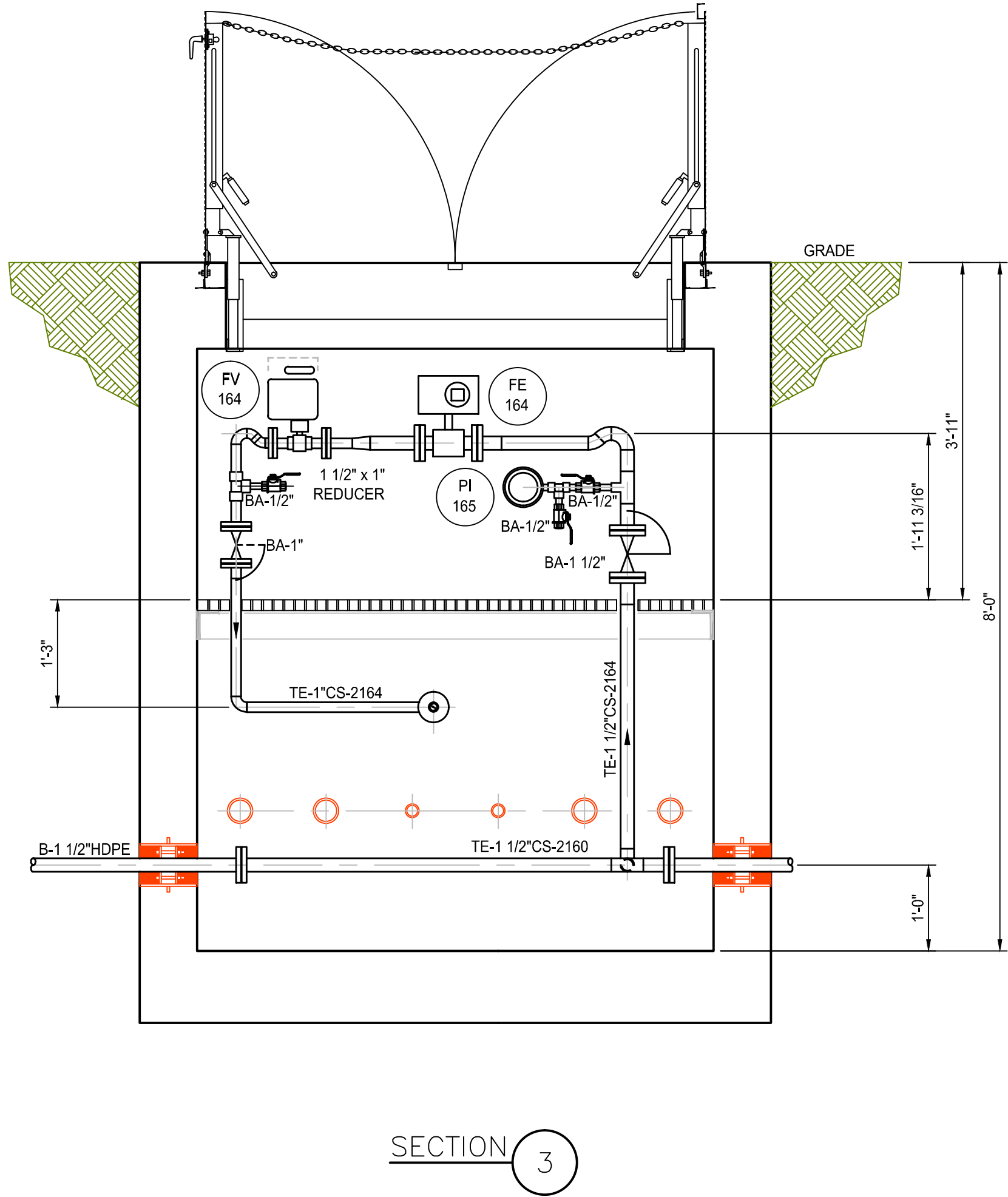
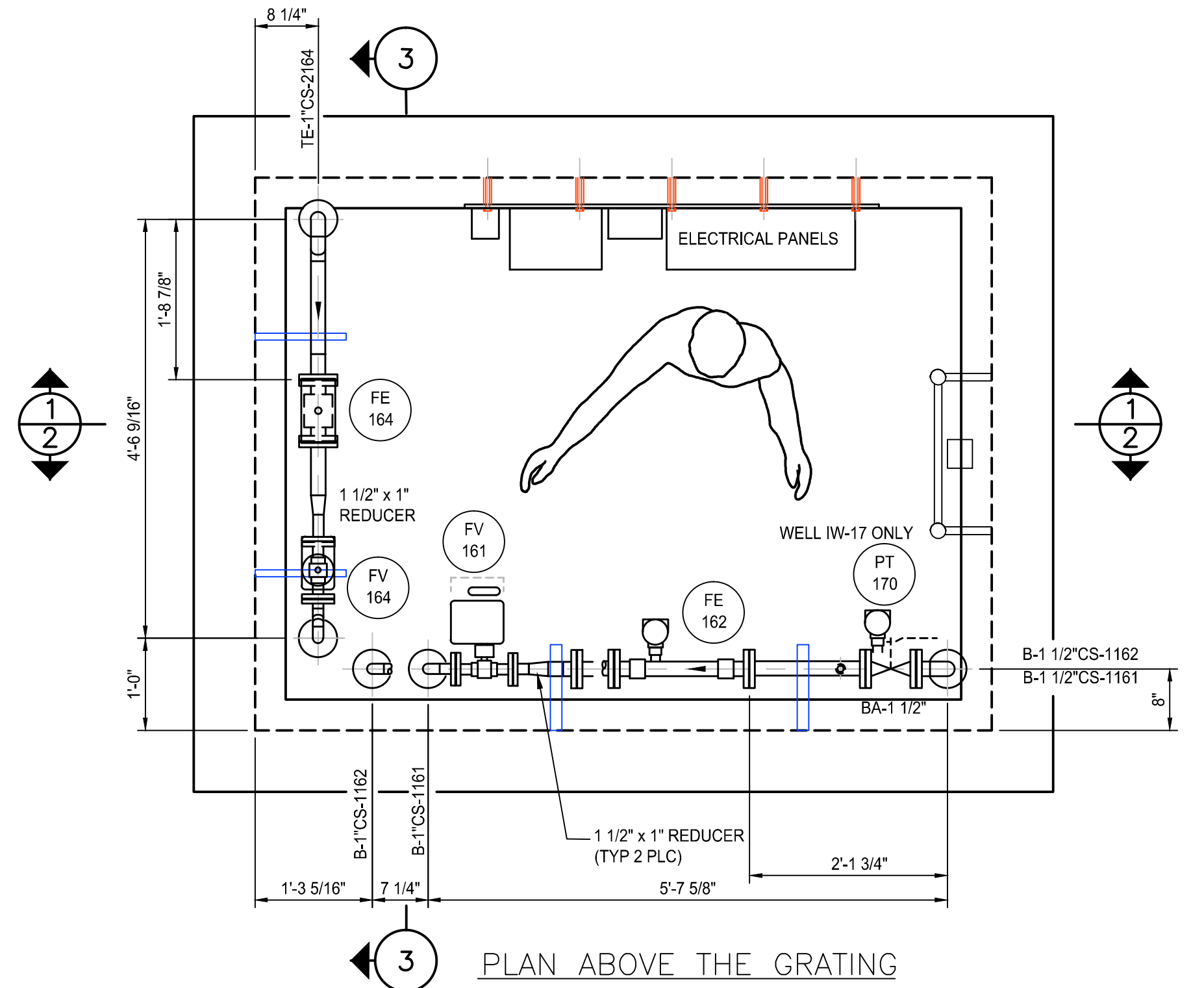
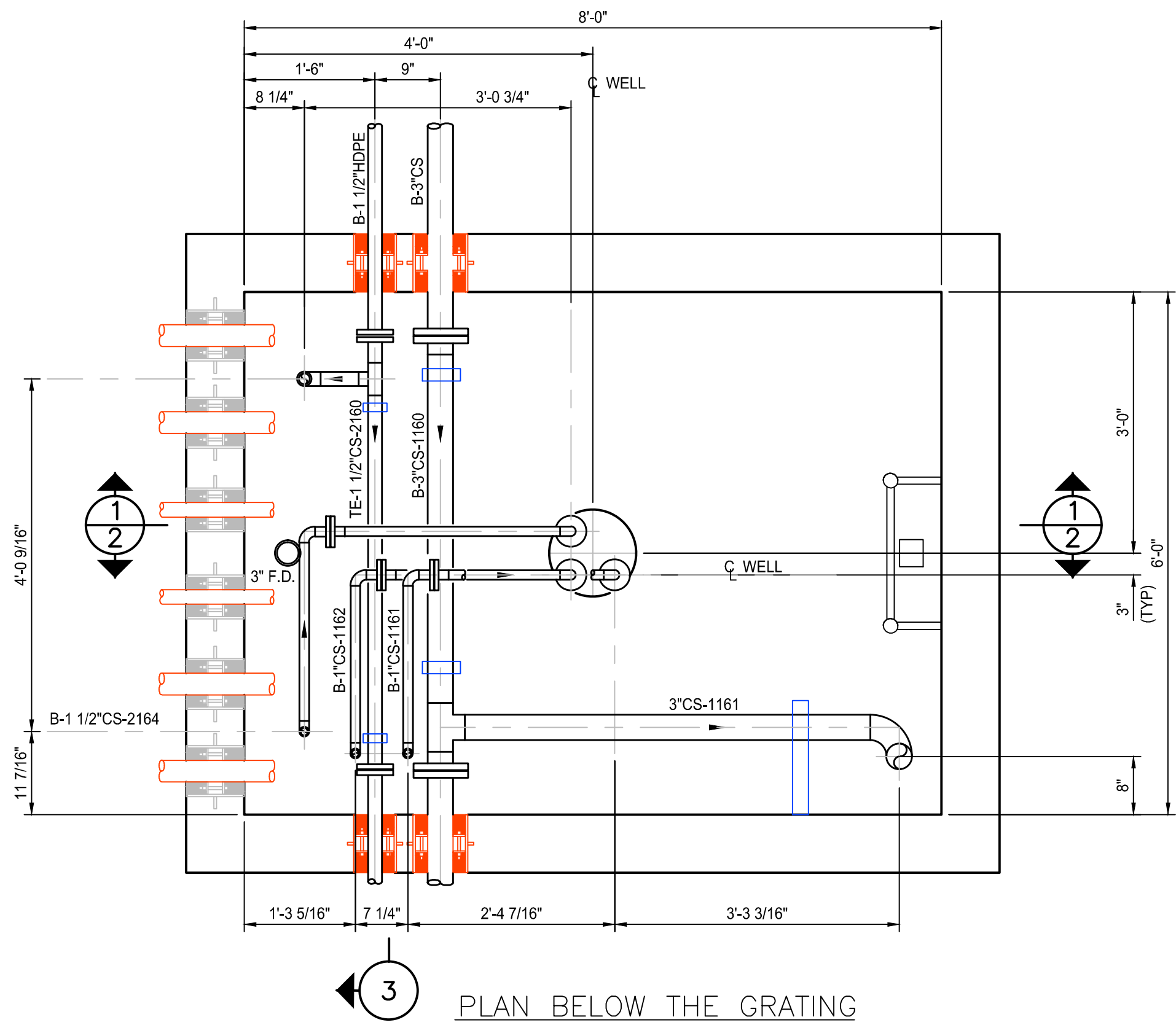








WELL NUMBER	LINE NUMBER	INSTRUMENT NUMBER					"TIE POINT" NUMBER
		PI	PT	FE	FV	FE	
IW-16	TE-1 1/2"CS-2160						TP-4, TP-56
	B-3"CS-1160	160					TP-6, TP-8
	TE-1 1/2"CS-2164	165		164	164		TP-5
	B-1 1/2"CS-1161				161	161	TP-7
	B-1 1/2"CS-1162				162	162	TP-9
IW-17	TE-1 1/2"CS-2170						TP-10, TP-57
	B-3"CS-1170	170					TP-12, TP-14
	TE-1 1/2"CS-2174	175		174	174		TP-11
	B-1 1/2"CS-1171		170		171	171	TP-13
	B-1 1/2"CS-1172				172	172	TP-15
IW-18	TE-1 1/2"CS-2180						TP-16, TP-58
	B-3"CS-1180	180					TP-18, TP-20
	TE-1 1/2"CS-2184	185		184	184		TP-17
	B-1 1/2"CS-1181				181	181	TP-19
	B-1 1/2"CS-1182				182	182	TP-21
IW-19	TE-1 1/2"CS-2190						TP-22
	B-3"CS-1190	190					TP-24
	TE-1 1/2"CS-2194	195		194	194		TP-23
	B-1 1/2"CS-1191				191	191	TP-25
	B-1 1/2"CS-1192				192	192	TP-27



AS BUILT  
RECORD DRAWING

NOTES:

1. THE VAULT SHOWN ABOVE IS FOR WELL IW-16. ALL VAULTS WERE PIPED AS PER THIS TYPICAL DRAWING. INSTRUMENT AND LINE NUMBERS FOR THE OTHER VAULTS MAY BE FOUND ON TABLE.
2. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
3. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
4. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.
5. WATER FLOW METER FE-XX4 CONFIGURED FOR REVERSE FLOW AND INSTALLED BACKWARD.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

WARNING: ALTERING THIS DOCUMENT IS IN VIOLATION OF THE NEW YORK STATE EDUCATION LAW EXCEPTING AS PROVIDED IN SECTION 7209, PART 2 OF THE LAW.

HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

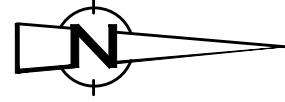
INJECTION WELLS IW-16, 17, 18 & 19  
PLAN AND SECTIONS



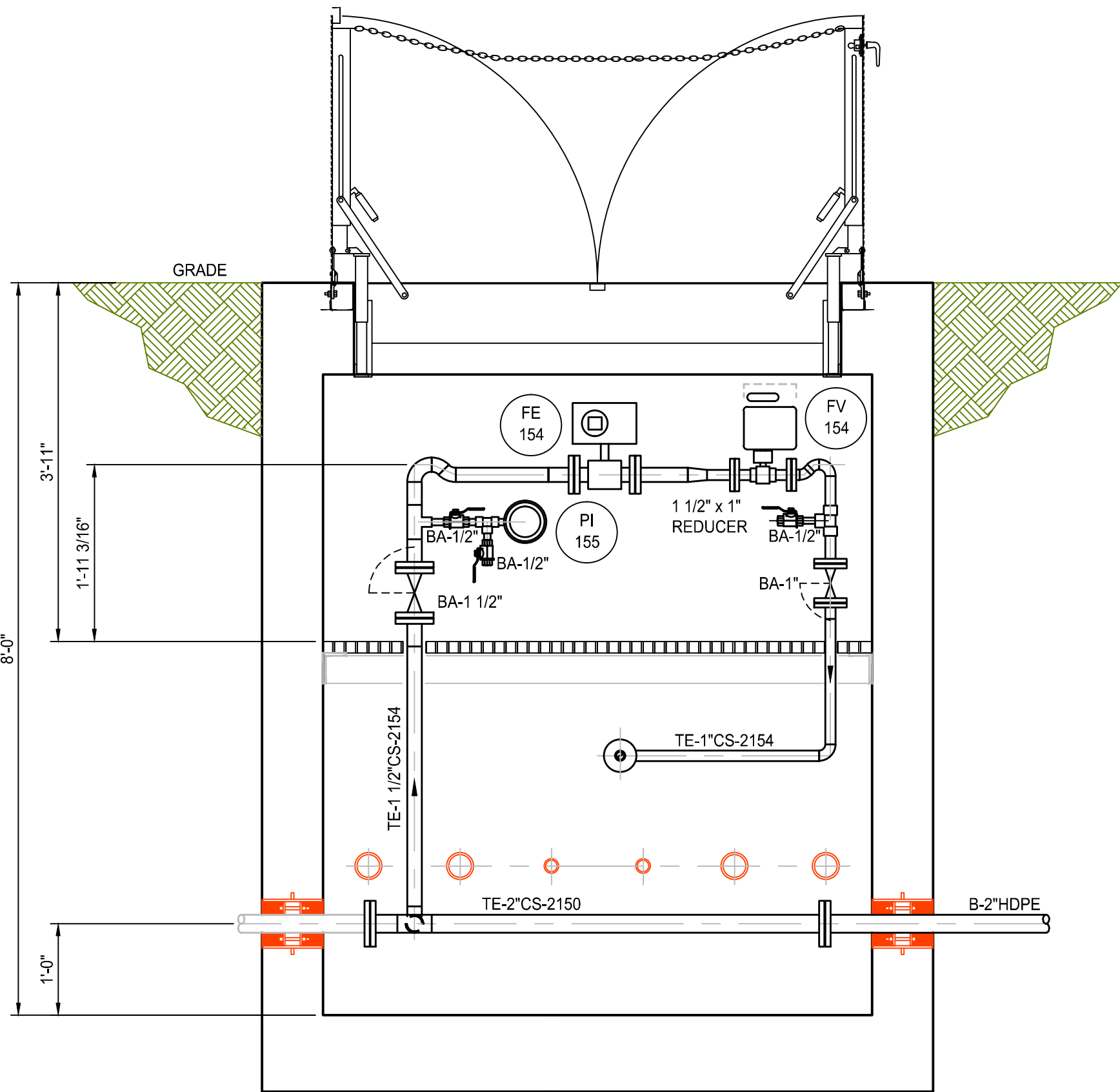
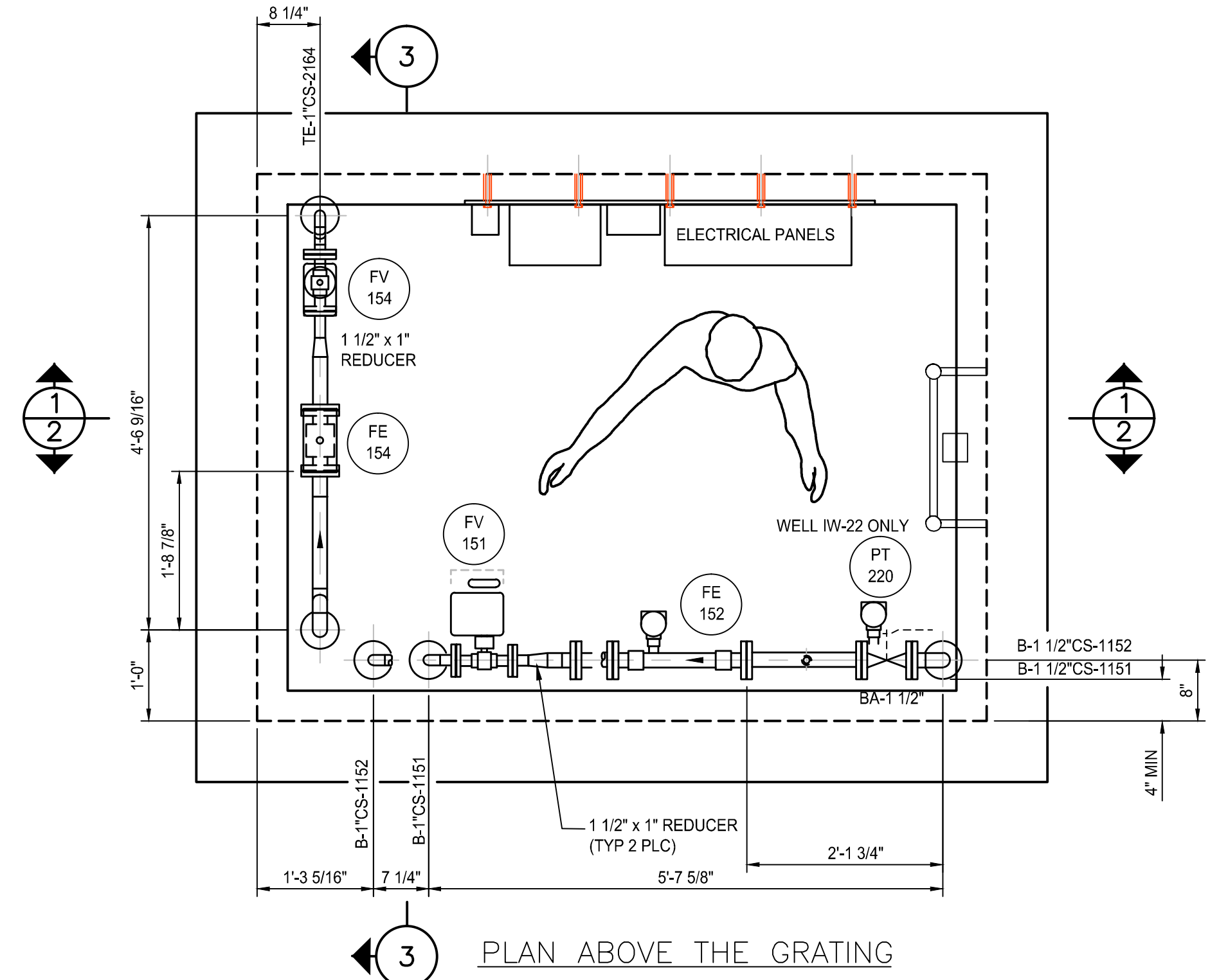
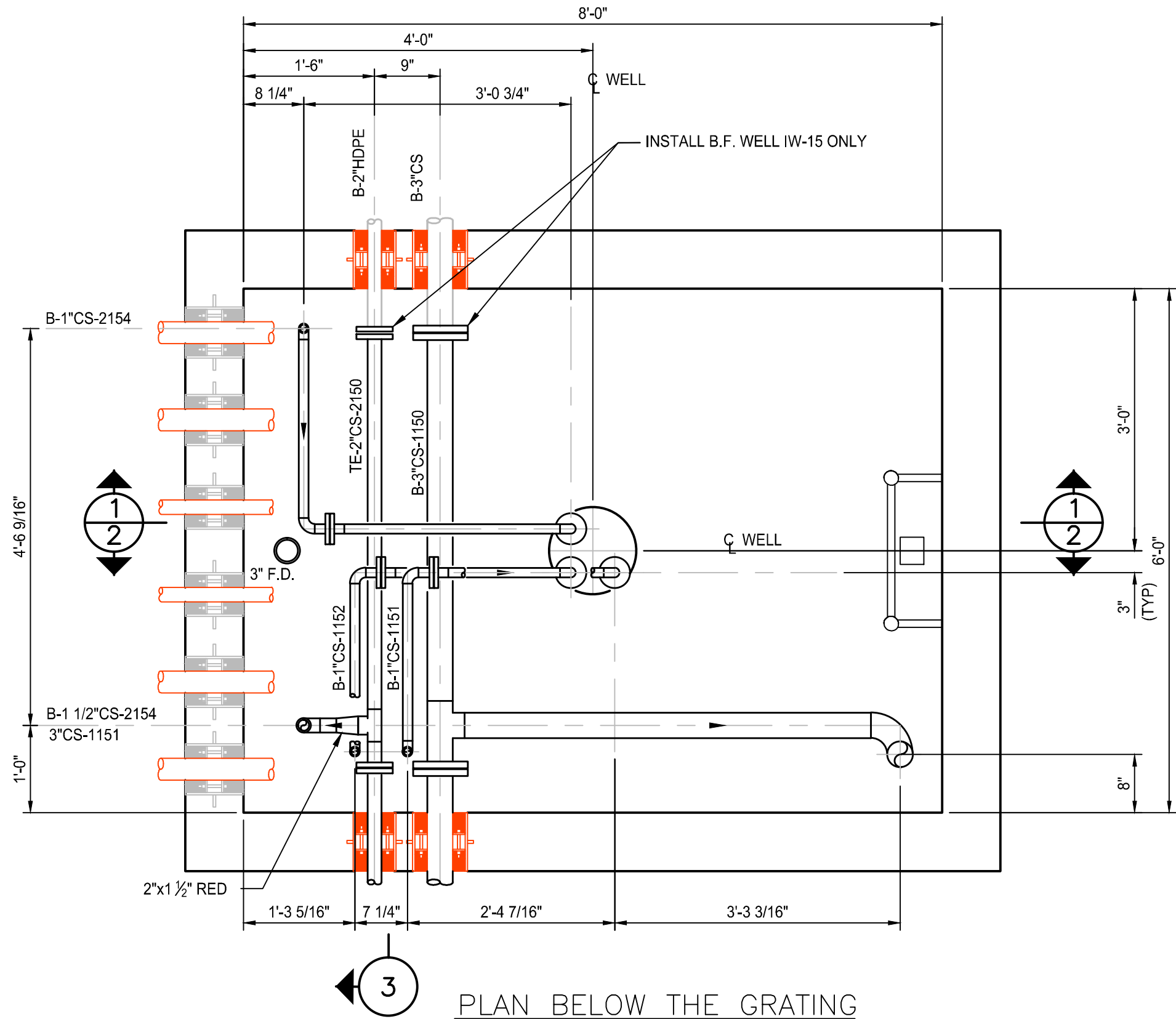
**CRA Infrastructure & Engineering, Inc.**

Source Reference:		Date:	
Project Manager:		7-23-03	
J. KAY	Reviewed By:	B. A. BEEBE	Drawn By:
NONE	Project No:	06883-00	056
	Report No:		Drawing No:
			MP-06

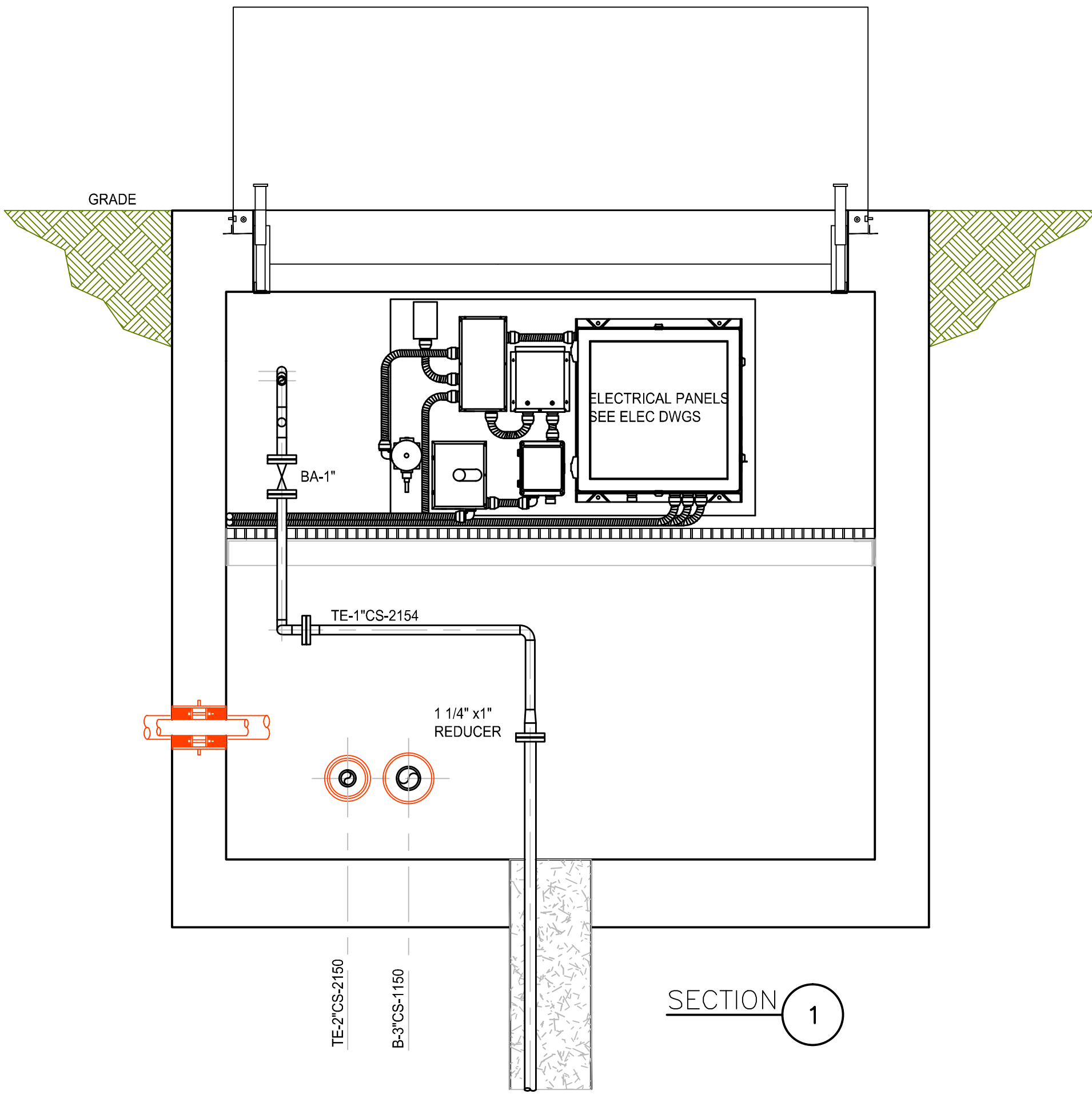




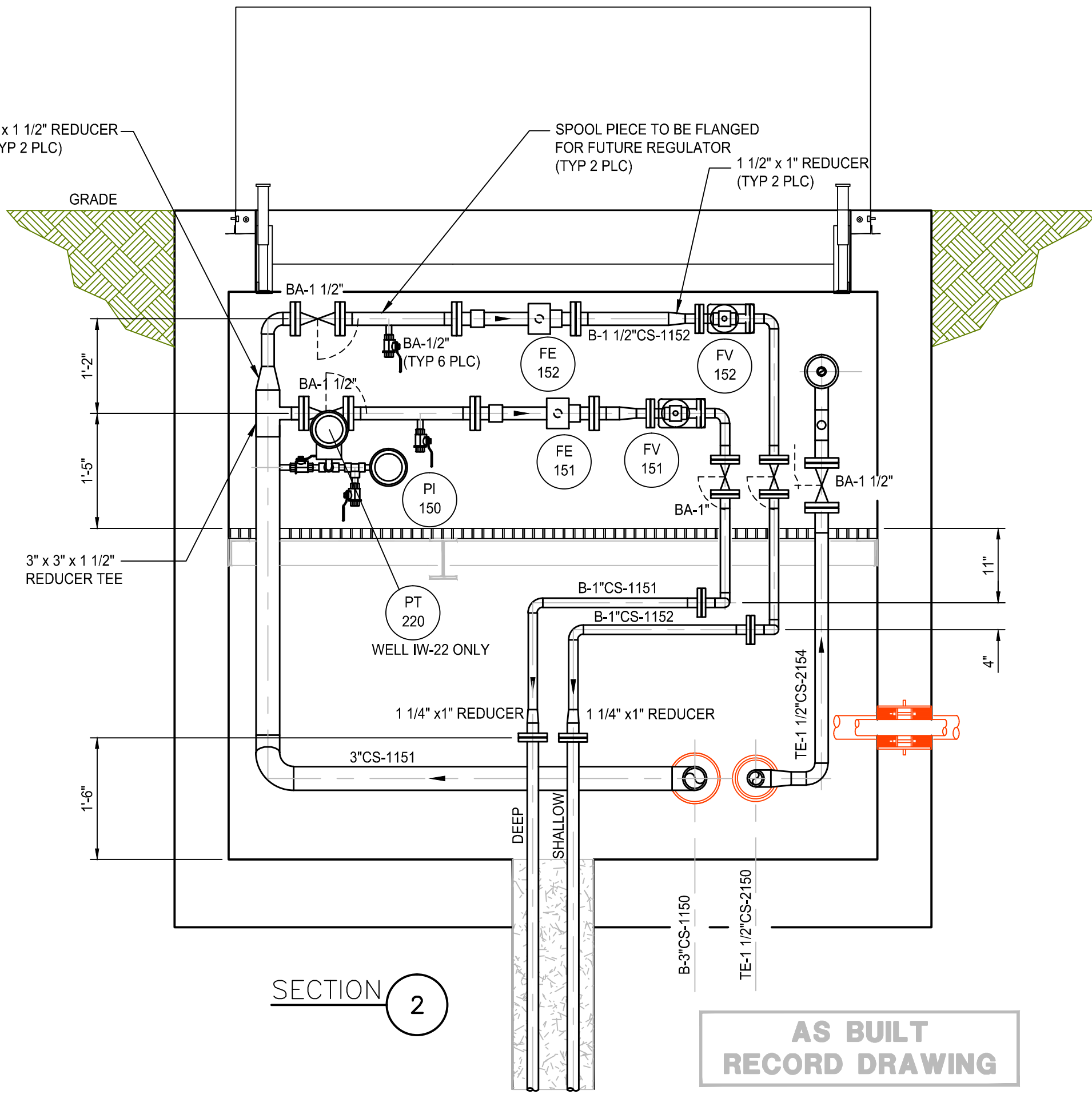
WELL NUMBER	LINE NUMBER	INSTRUMENT NUMBER					
		PI	PT	FE	FV	FE	
IW-15	TE-2"CS-2150						
	B-3"CS-1150	150					
	TE-1 1/2"CS-2154	155		154	154		
	B-1 1/2"CS-1151				151	151	
IW-20	TE-2"CS-2200						
	B-3"CS-1200	200					
	TE-1 1/2"CS-2204	205		204	204		
	B-1 1/2"CS-1201				201	201	
IW-22	TE-2"CS-2210						
	B-3"CS-1220	220					
	TE-1 1/2"CS-2224	225		224	224		
	B-1 1/2"CS-1221		220		221	221	
	B-1 1/2"CS-1222				222	222	



SECTION 3



SECTION 1



SECTION 2

AS BUILT  
RECORD DRAWING

NOTES:

1. THE VAULT SHOWN ABOVE IS FOR WELL IW-15. ALL VAULTS WERE PIPED AS PER THIS TYPICAL DRAWING. INSTRUMENT AND LINE NUMBERS FOR THE OTHER VAULTS MAY BE FOUND ON TABLE.
2. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
3. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
4. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

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HOOKE/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

INJECTION WELLS IW-15, 20 AND 22  
PLAN AND SECTIONS



**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:

Date: 7-23-03

Project Manager:  
J. KAY

Reviewed By:  
B. A. BEEBE

Designed By:  
B. A. BEEBE

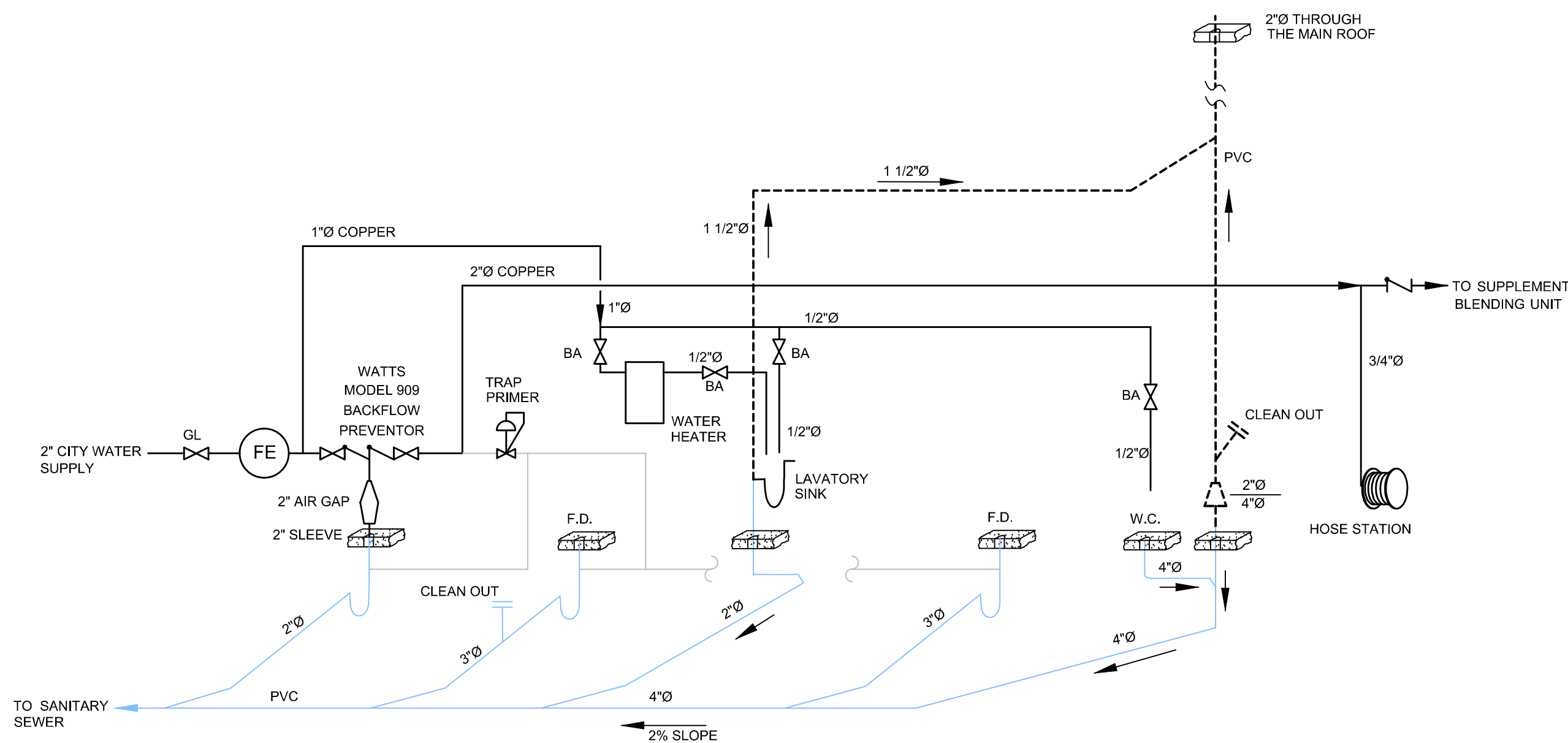
Drawn By:  
B. A. BEEBE

Scale:  
NONE

Project No:  
06883-00

Report No:  
055

Drawing No:  
MP-07



GENERAL PLUMBING NOTES:

1. ALL WORKS MUST COMPLY WITH NEW YORK PLUMBING CODE.
2. REFER TO WRITTEN SPECIFICATIONS FOR SPECS ON FIXTURES, PIPING MATERIALS, INSTALLATIONS, ETC., UNLESS INDICATED OTHERWISE.
3. THESE PLANS MAKE NO ATTEMPT TO SHOW ALL ITEMS REQUIRED FOR COMPLETE INSTALLATION. ALL FIXTURES MUST BE ROUGHED IN AND INSTALLED IN STRICT ACCORDANCE WITH MFG'S SHOP DWGS AND INSTALLATION PROCEDURES. CONTRACTOR MUST FURNISH AND INSTALL ALL ITEMS, FITTINGS, AND MISCELLANEOUS HARDWARE NEEDED FOR PLUMBING-CODE COMPLIANCE AND COMPLETE OPERATIONAL SERVICE AND MAINTENANCE.

LAVATORY PLUMBING  
NOT TO SCALE

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

WARNING: ALTERING THIS DOCUMENT IS  
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EDUCATION LAW EXCEPTING AS PROVIDED  
IN SECTION 7209, PART 2 OF THE LAW.

HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

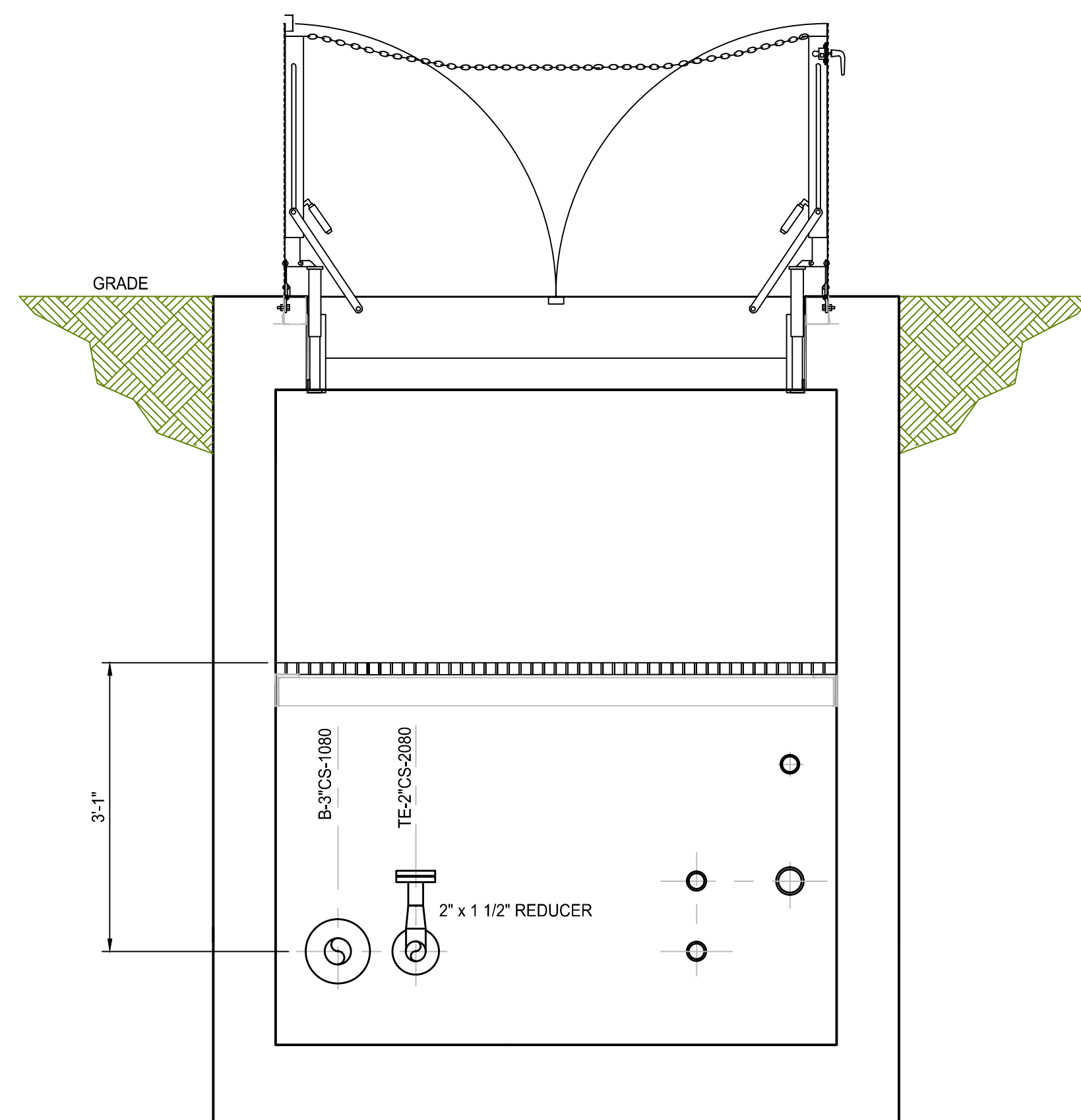
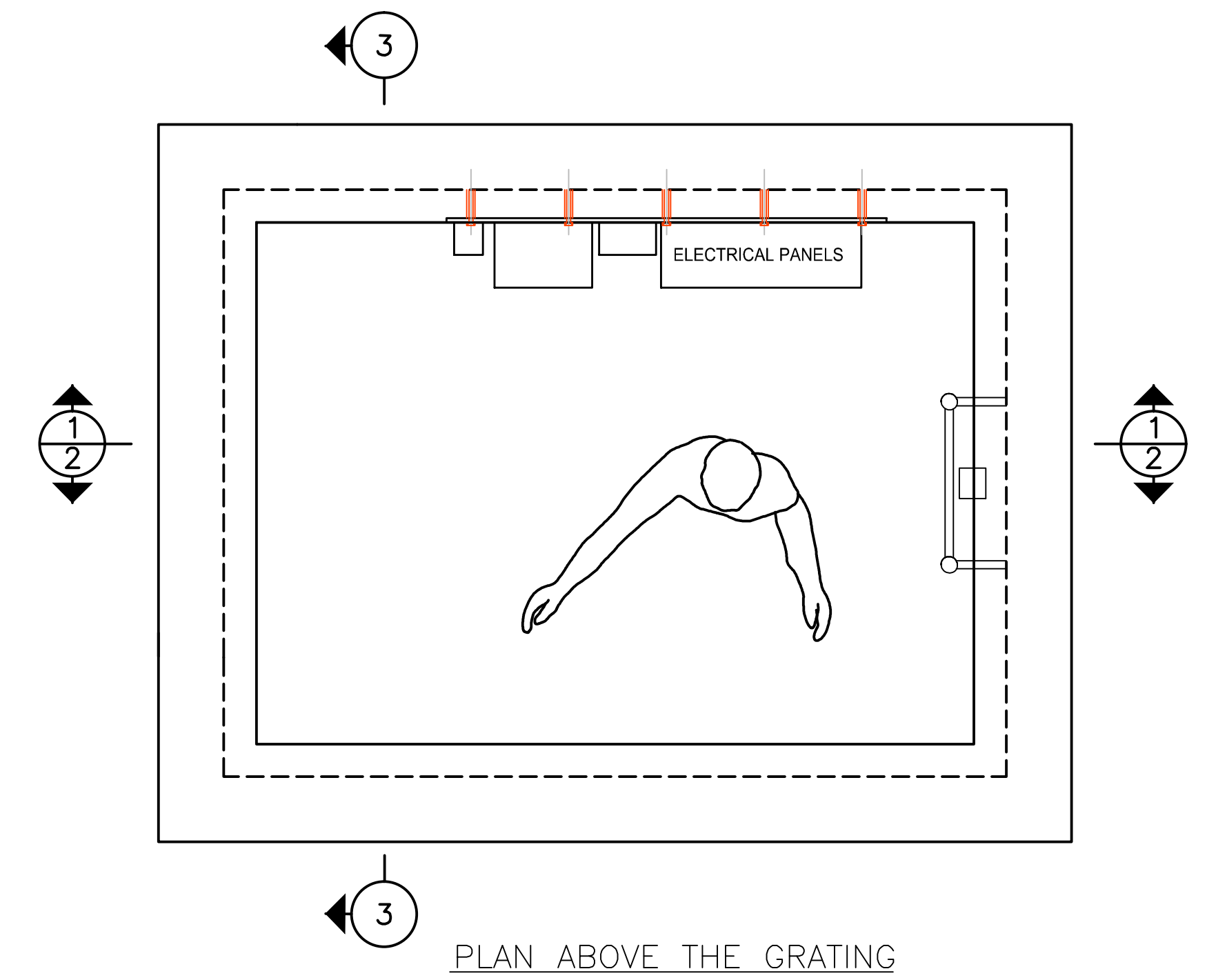
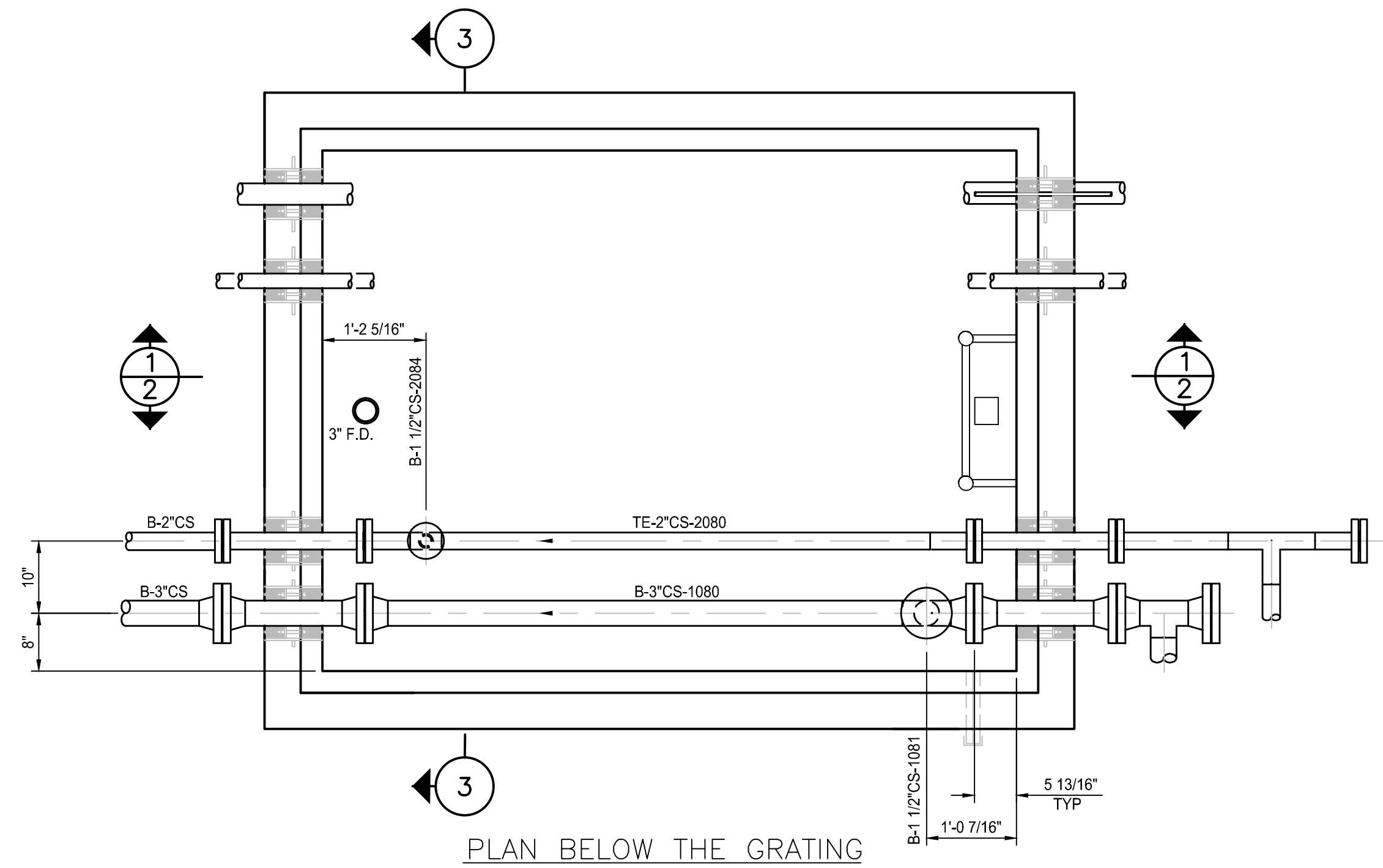
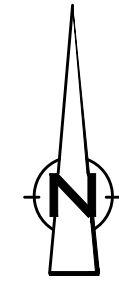
BIOSPARGE TREATMENT SYSTEM

LAVATORY PLUMBING

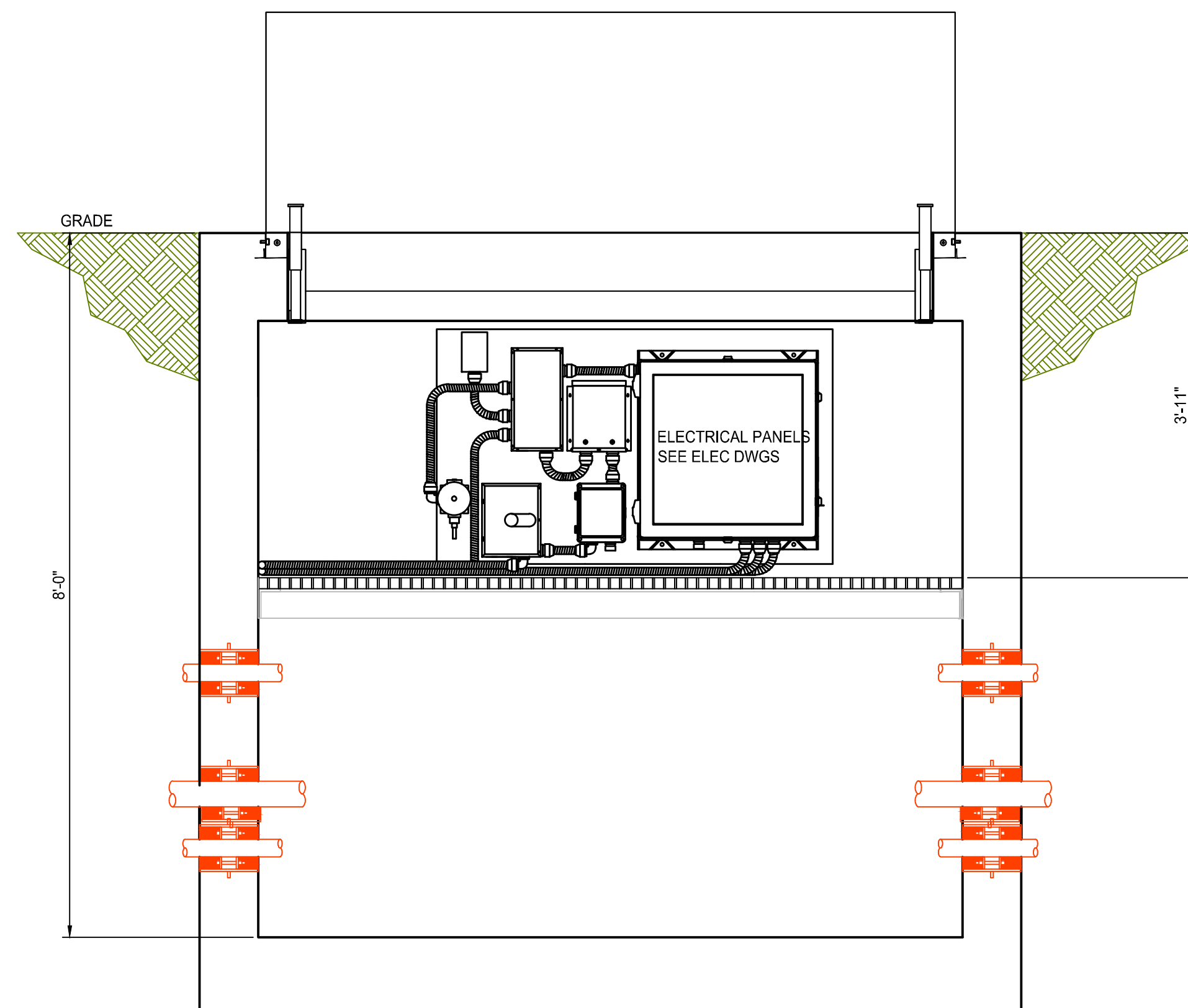


CRA Infrastructure  
& Engineering, Inc.

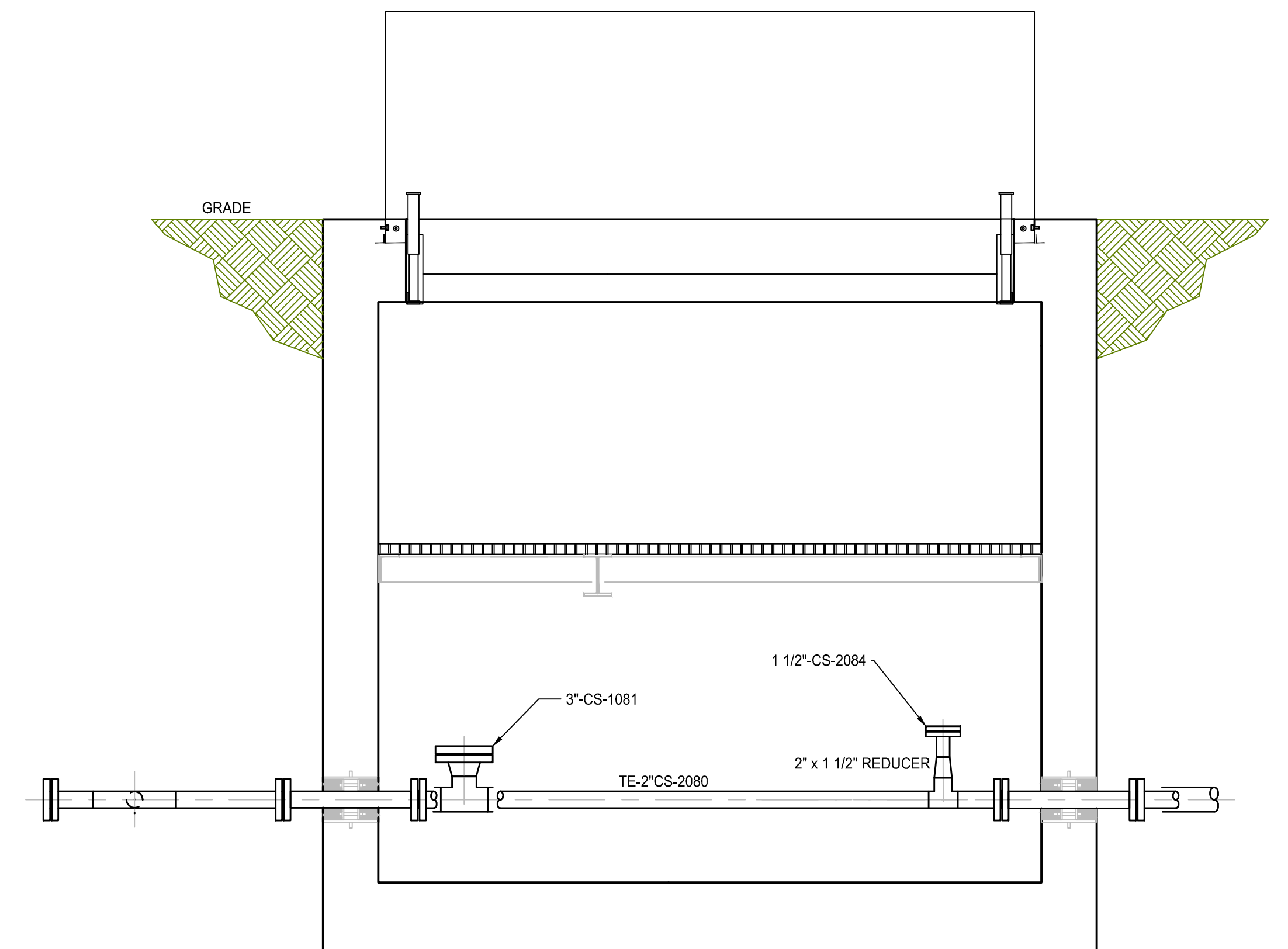
Source Reference:			Date: AUGUST 2012
Project Manager: J. KAY	Reviewed By:	Designed By:	Drawn By:
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: MP-08



SECTION 3



SECTION 1



SECTION 2

AS BUILT  
RECORD DRAWING

NOTES:

1. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
2. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
3. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

WARNING: ALTERING THIS DOCUMENT IS  
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EDUCATION LAW EXCEPTING AS PROVIDED  
IN SECTION 7209, PART 2 OF THE LAW.

HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

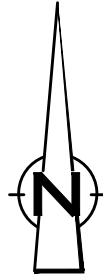
BIOSPARGE TREATMENT SYSTEM

INJECTION WELL IW-08  
PLAN AND SECTIONS

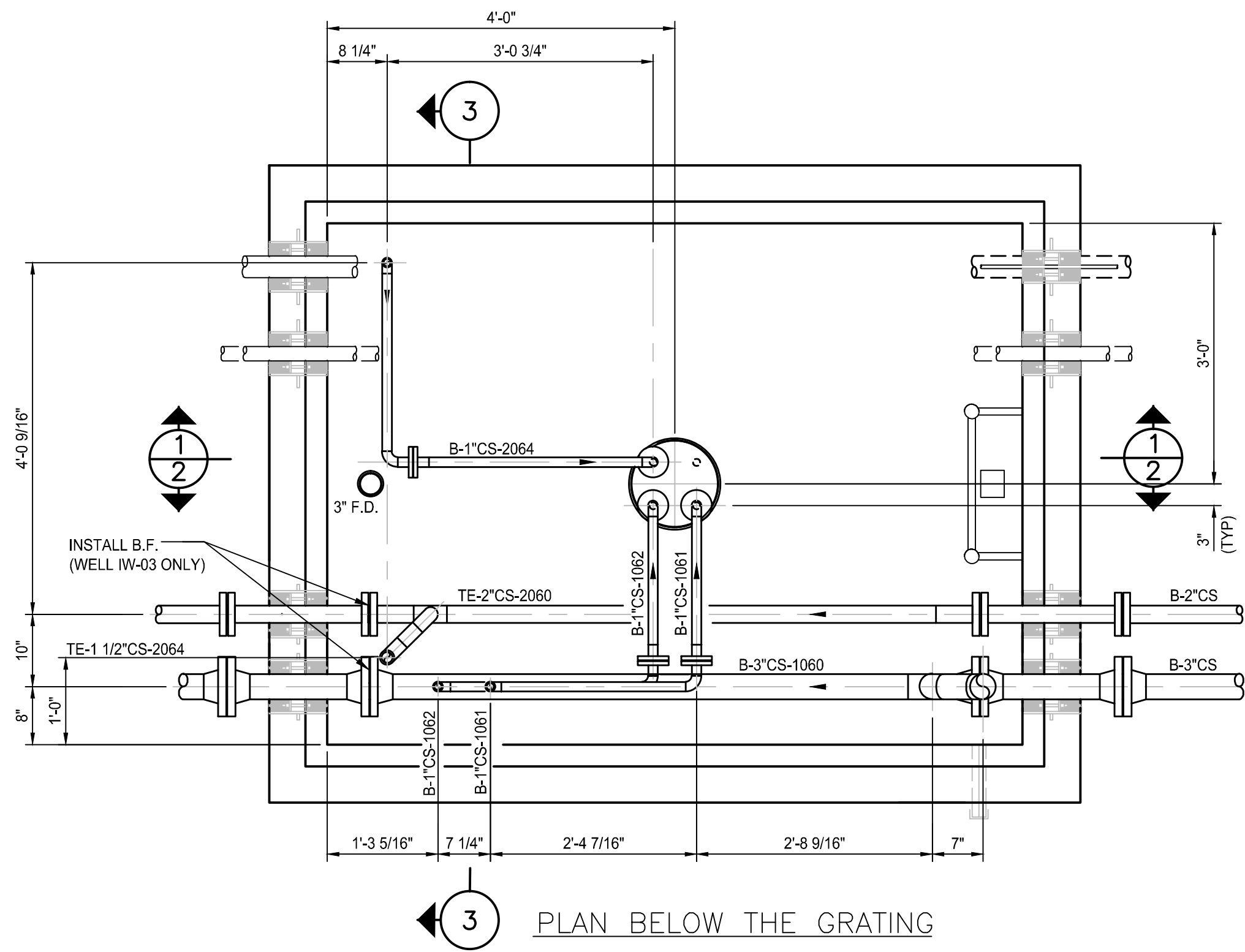
**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:		Date: 7-23-03	
Project Manager: J. KAY	Reviewed By:	Designed By: B. A. BEEBE	Drawn By: B. A. BEEBE
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: MP-09

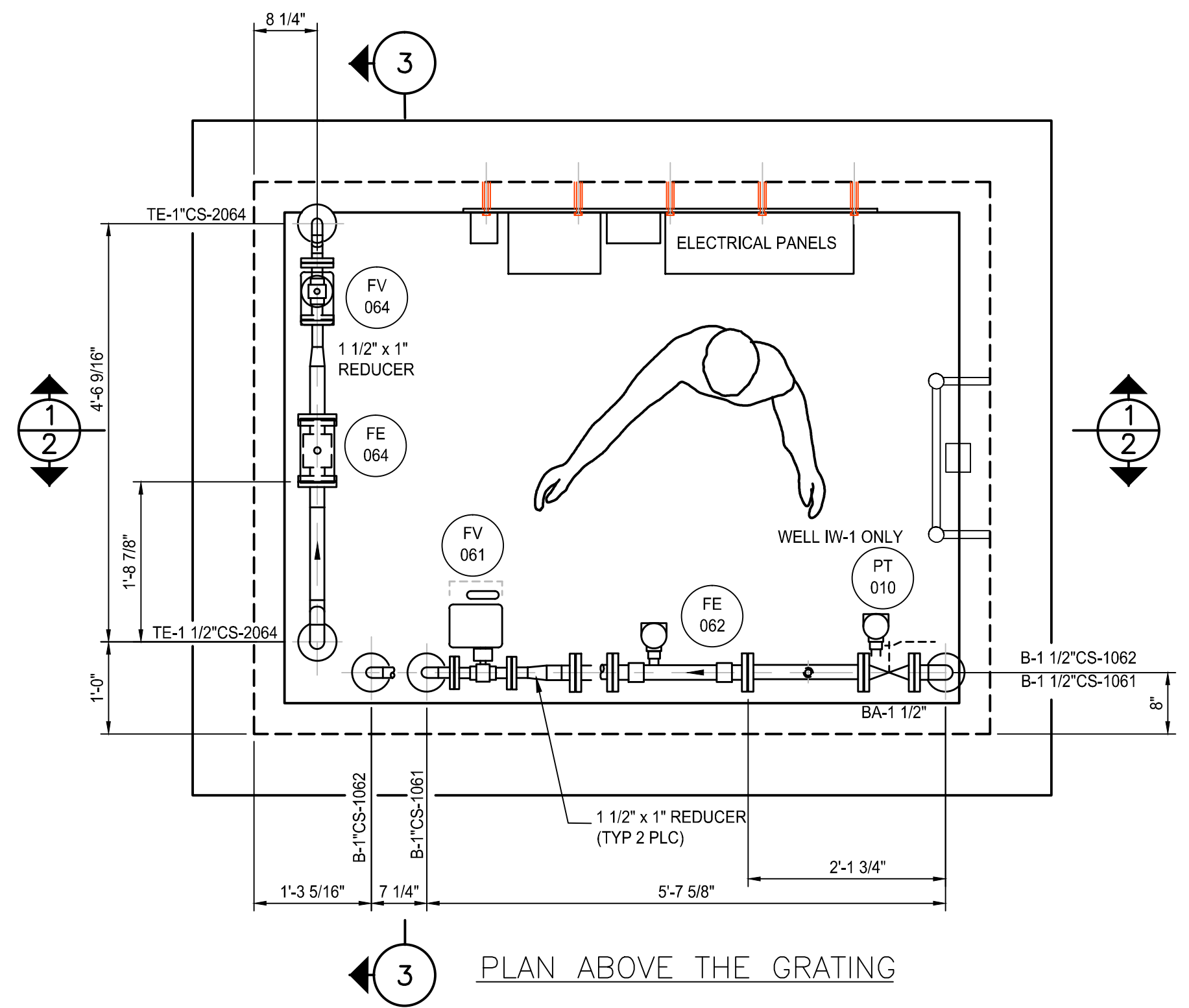




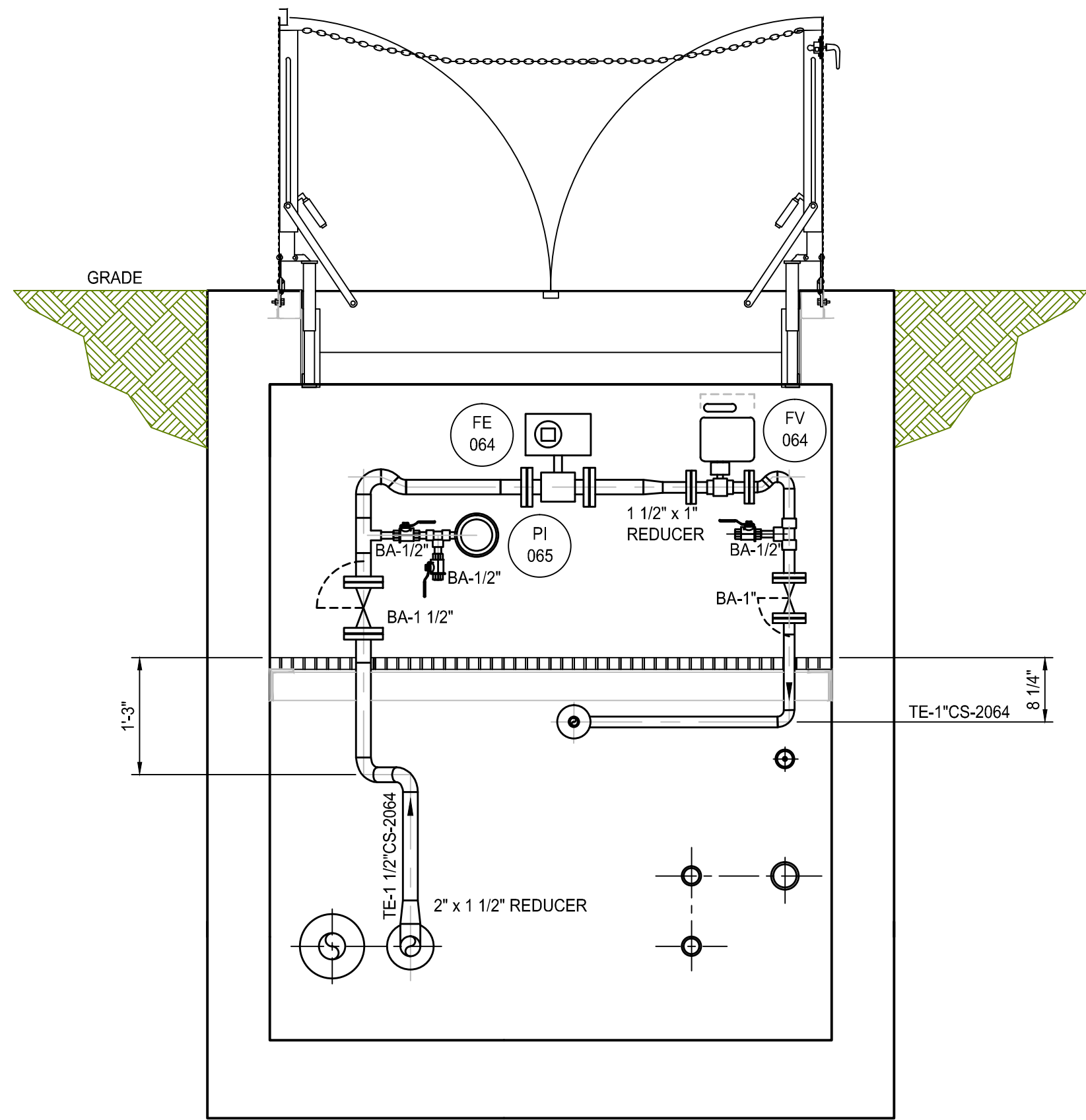
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	B-1 1/2"CS-1011		010		011	011		
IW-02	B-1 1/2"CS-1012				012	012		TP-67,TP-69
	TE-2"CS-2020							TP-69,TP-70
	B-3"CS-1020	020						
	TE-1 1/2"CS-2024	025		024	024			
IW-03	B-1 1/2"CS-1021				021	021		
	B-1 1/2"CS-1022				022	022		
	TE-2"CS-2030							TP-64,TP-66
	B-3"CS-1030	030						TP-63,TP-65
IW-04	TE-1 1/2"CS-2034	035		034	034			
	B-1 1/2"CS-1031				031	031		
	B-1 1/2"CS-1032				032	032		
	TE-2"CS-2040							TP-45,TP-47
IW-05	B-3"CS-1040	040						TP-44,TP-46
	TE-1 1/2"CS-2044	045		044	044			
	B-1 1/2"CS-1041				041	041		
	B-1 1/2"CS-1042				042	042		
IW-06	TE-2"CS-2050							TP-41,TP-43
	B-3"CS-1050	050						TP-40,TP-42
	TE-1 1/2"CS-2054	055		054	054			
	B-1 1/2"CS-1051				051	051		
IW-07	B-1 1/2"CS-1052				052	052		
	TE-2"CS-2060							TP-37,TP-39
	B-3"CS-1060	060						TP-36,TP-38
	TE-1 1/2"CS-2064	065		064	064			
IW-08	B-1 1/2"CS-1061				061	061		
	B-1 1/2"CS-1062				062	062		
	TE-2"CS-2070							TP-33,TP-35
	B-3"CS-1070	070						TP-32,TP-34
IW-09	TE-1 1/2"CS-2074	075		074	074			
	B-1 1/2"CS-1071				071	071		
	B-1 1/2"CS-1072				072	072		



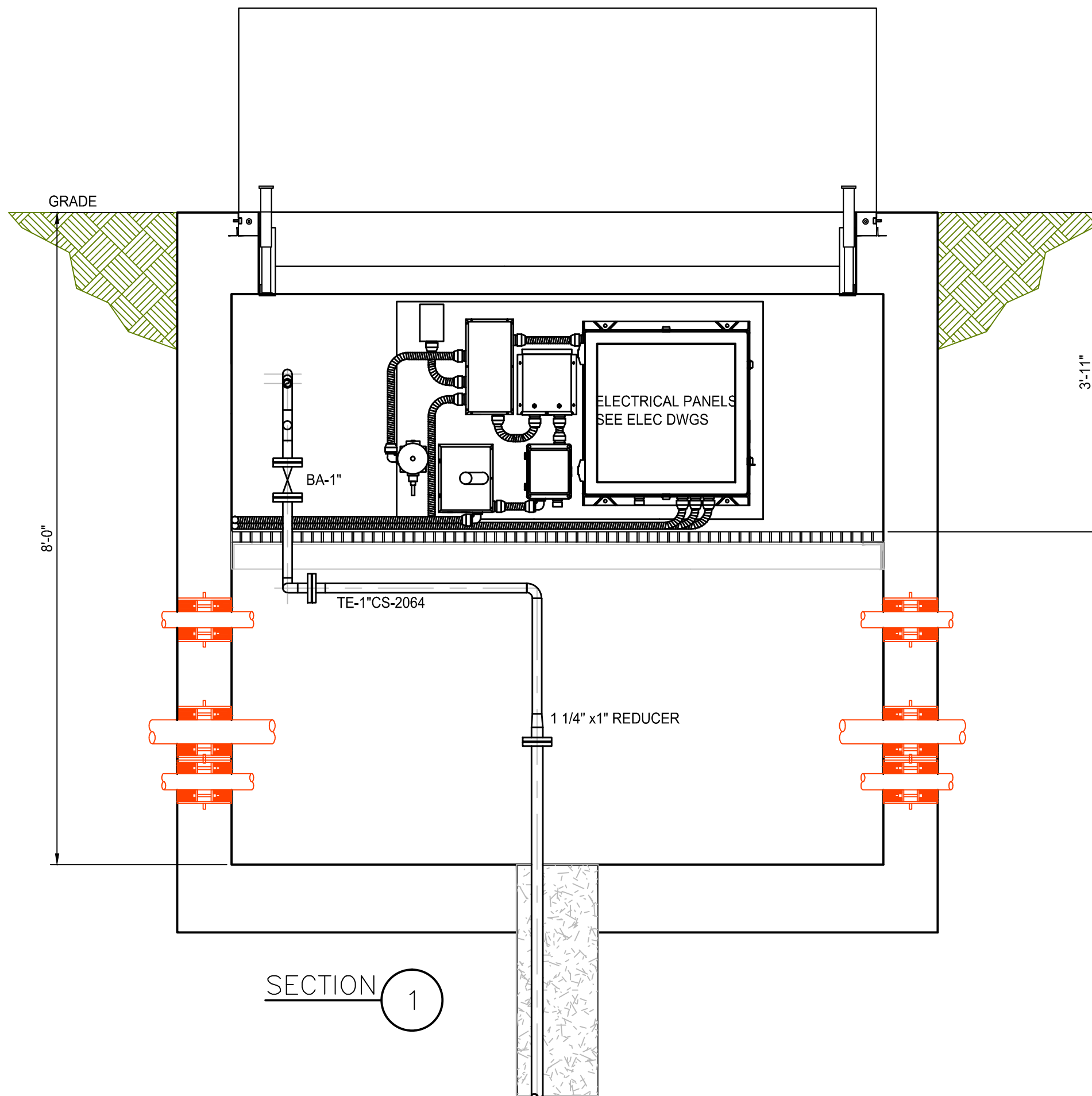
PLAN BELOW THE GRATING



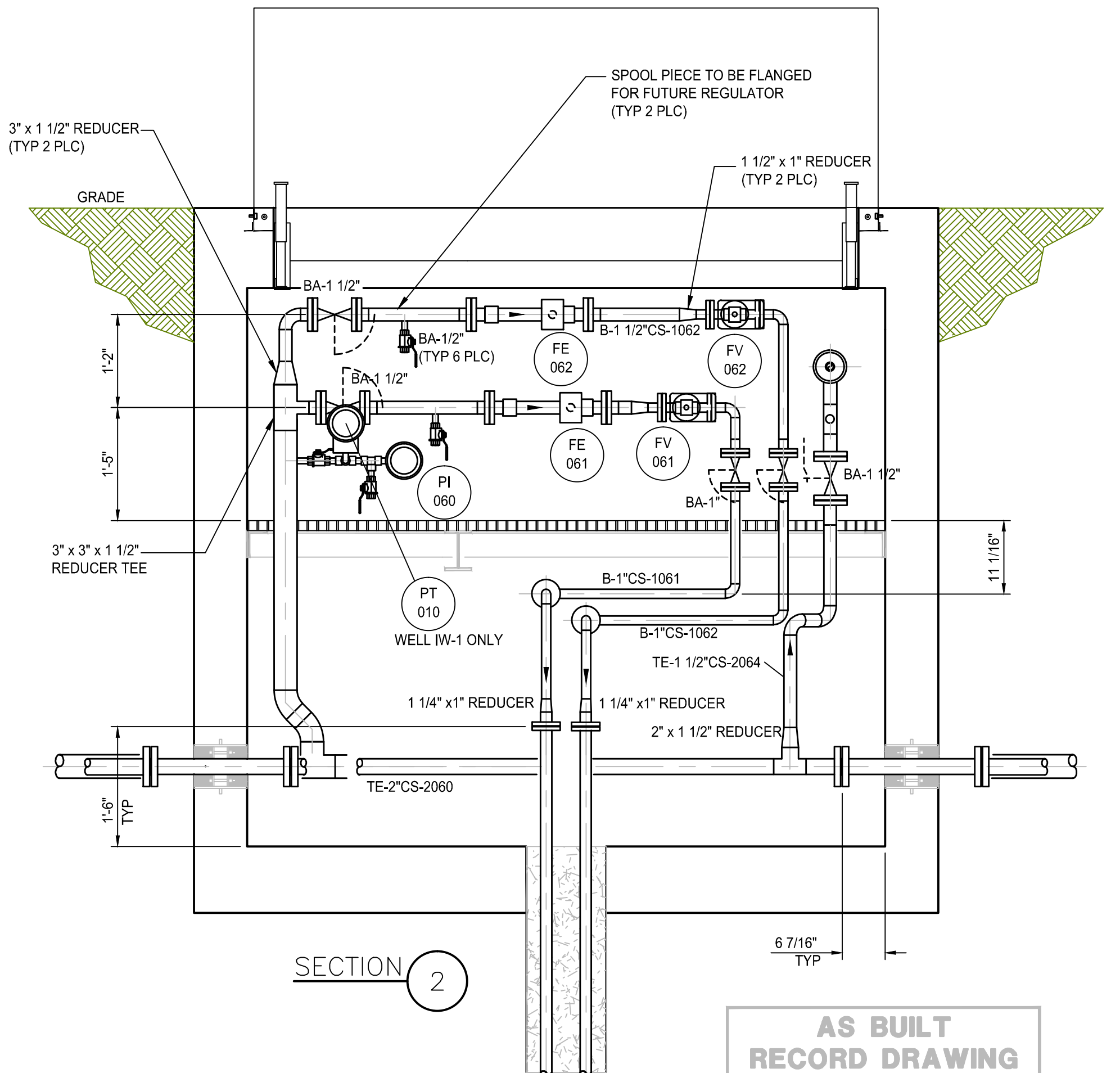
PLAN ABOVE THE GRATING



SECTION 3



SECTION 1



SECTION 2

AS BUILT  
RECORD DRAWING

NOTES:

1. THE VAULT SHOWN ABOVE IS FOR WELL IW-06. ALL VAULTS WERE PIPED AS PER THIS TYPICAL DRAWING. INSTRUMENT AND LINE NUMBERS FOR THE OTHER VAULTS MAY BE FOUND ON TABLE.
2. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
3. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
4. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV	
No	Revision	Date	Initial	

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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

INJECTION WELLS IW-01 THRU IW-07  
PLANS AND SECTIONS



Source Reference:

Date:

7-23-03

Project Manager:

J. KAY

Reviewed By:

B. A. BEEBE

Designed By:

B. A. BEEBE

Drawn By:

B. A. BEEBE

Scale:

NONE

Project No:

06883-00

Report No:

056

Drawing No:

MP-10

REV	SIZE & LINE No.	DESCRIPTION (TO & FROM)	PIPING DRAWING	P & ID DRAWING	DATE COMPLETED	TRACED		INSULATION			TIE POINT No.	REMARKS
						STEAM	ELECTRICAL	THK	SPEC	JACKET		
	3"CS-1000	PRIMARY AIR COMPRESSOR TO COMPRESSOR AIR DRYER	MP-02, 03 & 04	EF-01 S1		N	N	N	N	N		INSIDE BLDG
	3"CS-1001	3"CS-1002 TO 3"CS-1080	MP-01	EF-01 S1		N	N	N	N	N		NORTH, UNDERGROUND
	3"CS-1002	COMPRESSOR AIR DRYER TO 3"CS-1160	MP-02, 03 & 04	EF-01 S1		N	N	N	N	N		INSIDE BLDG
	3"CS-1010	3"CS-1020 (IW-02) TO END	MP-01, 10	EF-08		N	N	N	N	N		IW-01
	3"CS-1011	3"CS-1010 TO WELL	MP-10	EF-08		N	N	N	N	N		IW-01
	3"CS-1012	3"CS-1011 TO WELL	MP-10	EF-08		N	N	N	N	N		IW-01
	3"CS-1020	3"CS-1030 (IW-03) TO 3"CS-1010 (IW-01)	MP-01, 10	EF-08		N	N	N	N	N		IW-02
	3"CS-1021	3"CS-1020 TO WELL	MP-10	EF-08		N	N	N	N	N		IW-02
	3"CS-1022	3"CS-1021 TO WELL	MP-10	EF-08		N	N	N	N	N		IW-02
	3"CS-1030	3"CS-1040 (IW-04) TO 3"CS-1020 (IW-02)	MP-01, 10	EF-07		N	N	N	N	N		IW-03
	3"CS-1031	3"CS-1030 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-03
	3"CS-1032	3"CS-1031 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-03
	3"CS-1040	3"CS-1050 (IW-05) TO 3"CS-1030 (IW-03)	MP-01, 10	EF-07		N	N	N	N	N		IW-04
	3"CS-1041	3"CS-1040 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-04
	3"CS-1042	3"CS-1041 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-04
	3"CS-1050	3"CS-1060 (IW-06) TO 3"CS-1040 (IW-04)	MP-01, 10	EF-07		N	N	N	N	N		IW-05
	3"CS-1051	3"CS-1050 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-05
	3"CS-1052	3"CS-1051 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-05
	3"CS-1060	3"CS-1070 (IW-07) TO 3"CS-1050 (IW-05)	MP-01, 10	EF-06		N	N	N	N	N		IW-06
	3"CS-1061	3"CS-1060 TO WELL	MP-10	EF-06		N	N	N	N	N		IW-06
	3"CS-1062	3"CS-1061 TO WELL	MP-10	EF-06		N	N	N	N	N		IW-06
	3"CS-1070	3"CS-1080 (IW-08) TO 3"CS-1060 (IW-06)	MP-01, 10	EF-06		N	N	N	N	N		IW-07
	3"CS-1071	3"CS-1070 TO WELL	MP-10	EF-06		N	N	N	N	N		IW-07
	3"CS-1072	3"CS-1071 TO WELL	MP-10	EF-06		N	N	N	N	N		IW-07
	3"CS-1080	3"CS-1001 TO 3"CS-1070	MP-01, 09	EF-06		N	N	N	N	N		IW-08

REV	SIZE & LINE No.	DESCRIPTION (TO & FROM)	PIPING DRAWING	P & ID DRAWING	DATE COMPLETED	TRACED		INSULATION			TIE POINT No.	REMARKS
						STEAM	ELECTRICAL	THK	SPEC	JACKET		
	1 1/2"CS-2000	WATER SUPPLY TO 2"HDPE-2080	MP-02, 04	EF-01 S2		N	N	N	N	N		INSIDE BLDG
	1"CS-2004	1 1/2"CS-2000 TO SUPPLEMENT BLENDING UNIT	MP-02, 04	EF-01 S2		N	N	N	N	N		INSIDE BLDG
	2"CS-2010	2"HDPE-2030 (IW-03) TO END	MP-01, 10	EF-08			Y					IW-01
	1 1/2"CS-2014	2"HDPE-2010 TO WELL	MP-10	EF-08			Y					IW-01
	2"CS-2020	2"HDPE-2030 (IW-03) TO 2"HDPE-2010 (IW-01)	MP-01, 10	EF-08			Y					IW-02
	1 1/2"CS-2024	2"HDPE-2020 TO WELL	MP-10	EF-08			Y					IW-02
	2"CS-2030	2"HDPE-2040 (IW-04) TO 2"HDPE-2020 (IW-02)	MP-01, 10	EF-07			Y					IW-03
	1 1/2"CS-2034	2"HDPE-2030 TO WELL	MP-10	EF-07			Y					IW-03
	2"CS-2040	2"HDPE-2050 (IW-05) TO 2"HDPE-2030 (IW-03)	MP-01, 10	EF-07			Y					IW-04
	1 1/2"CS-2044	2"HDPE-2040 TO WELL	MP-10	EF-07			Y					IW-04
	2"CS-2050	2"HDPE-2060 (IW-06) TO 2"HDPE-2040 (IW-04)	MP-01, 10	EF-07			Y					IW-05
	1 1/2"CS-2054	2"HDPE-2050 TO WELL	MP-10	EF-07			Y					IW-05
	2"CS-2060	2"HDPE-2070 (IW-07) TO 2"HDPE-2050 (IW-05)	MP-01, 10	EF-06			Y					IW-06
	1 1/2"CS-2064	2"HDPE-2060 TO WELL	MP-10	EF-06			Y					IW-06
	2"CS-2070	2"HDPE-2080 (IW-08) TO 2"HDPE-2060 (IW-06)	MP-01, 10	EF-06			Y					IW-07
	1 1/2"CS-2074	2"HDPE-2070 TO WELL	MP-10	EF-06			Y					IW-07
	2"HDPE-2080	1 1/2"CS-2000 TO 2"HDPE-2070 (IW-07)	MP-01, 09	EF-06			Y					IW-08

REV	SIZE & LINE No.	DESCRIPTION (TO & FROM)	PIPING DRAWING	P & ID DRAWING	DATE COMPLETED	TRACED		INSULATION			TIE POINT No.	REMARKS
						STEAM	ELECTRICAL	THK	SPEC	JACKET		
	3"CS-1150	3"CS-1060 TO 3"CS-1140 (IW-15)	MP-01, 06	EF-01 S1, 05		N	N	N	N	N		IN TRENCH
	3"CS-1151	3"CS-1150 TO WELL	MP-07	EF-05		N	N	N	N	N		IW-15
	3"CS-1152	3"CS-1151 TO WELL	MP-07	EF-05		N	N	N	N	N		IW-15
	3"CS-1160	3"CS-1002 TO 3"CS-1170 (IW-17)	MP-01, 06	EF-01 S1, 02		N	N	N	N	N		IW-16
	3"CS-1161	3"CS-1160 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-16
	3"CS-1162	3"CS-1161 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-16
	3"CS-1170	3"CS-1160 (IW-16) TO 3"CS-1180 (IW-18)	MP-01, 06	EF-01 S1, 02		N	N	N	N	N		IW-17
	3"CS-1171	3"CS-1170 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-17
	3"CS-1172	3"CS-1171 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-17
	3"CS-1180	3"CS-1170 (IW-17) TO 3"CS-1190 (IW-19)	MP-01, 06	EF-01 S1, 02		N	N	N	N	N		IW-18
	3"CS-1181	3"CS-1180 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-18
	3"CS-1182	3"CS-1181 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-18
	3"CS-1190	3"CS-1180 (IW-18) TO 3"CS-1200 (IW-20)	MP-01, 06	EF-03		N	N	N	N	N		IW-19
	3"CS-1191	3"CS-1190 TO WELL	MP-06	EF-03		N	N	N	N	N		IW-19
	3"CS-1192	3"CS-1191 TO WELL	MP-06	EF-03		N	N	N	N	N		IW-19
	3"CS-1200	3"CS-1190 (IW-19) TO 3"CS-1210 (IW-21)	MP-01, 07	EF-03		N	N	N	N	N		IW-20
	3"CS-1201	3"CS-1200 TO WELL	MP-07	EF-03		N	N	N	N	N		IW-20
	3"CS-1202	3"CS-1201 TO WELL	MP-07	EF-03		N	N	N	N	N		IW-20
	3"CS-1210	3"CS-1200 (IW-20) TO 3"CS-1220 (IW-22)	MP-01, 07	EF-03		N	N	N	N	N		IW-21
	3"CS-1211	3"CS-1210 TO WELL	MP-07	EF-03		N	N	N	N	N		IW-21
	3"CS-1212	3"CS-1211 TO WELL	MP-07	EF-03		N	N	N	N	N		IW-21
	3"CS-1220	3"CS-1210 (IW-21) TO END	MP-01, 07	EF-04		N	N	N	N	N		IW-22
	3"CS-1221	3"CS-1220 TO WELL	MP-07	EF-04		N	N	N	N	N		IW-22
	3"CS-1222	3"CS-1221 TO WELL	MP-07	EF-04		N	N	N	N	N		IW-22

REV	SIZE & LINE No.	DESCRIPTION (TO & FROM)	PIPING DRAWING	P & ID DRAWING	DATE COMPLETED	TRACED		INSULATION			TIE POINT No.	REMARKS
						STEAM	ELECTRICAL	THK	SPEC	JACKET		
	2"HDPE-2150	1 1/2"HDPE-2160 TO 2"HDPE-2140	MP-01, 07	EF-01 S2, 05			Y					IN TRENCH
	1"CS-2154	1 1/2"CS-2150 TO WELL	MP-07	EF-05			Y					IW-15
	1 1/2"HDPE-2160	1 1/2"HDPE-2002 TO 1 1/2"HDPE-2170 (IW-17)	MP-01, 06	EF-01 S1, 02			Y					IW-16
	1 1/2"CS-2164	1 1/2"CS-2160 TO WELL	MP-06	EF-02			Y					IW-16
	1 1/2"HDPE-2170	1 1/2"HDPE-2160 (IW-16) TO 1 1/2"HDPE2180 (IW-18)	MP-01, 06	EF-02			Y					IW-17
	1 1/2"CS-2174	1 1/2"CS-2170 TO WELL	MP-06	EF-02			Y					IW-17
	1 1/2"HDPE-2180	1 1/2"HDPE-2170 (IW-17) TO 1 1/2"HDPE2190 (IW-19)	MP-01, 06	EF-02			Y					IW-18
	1 1/2"CS-2184	1 1/2"CS-2180 TO WELL	MP-06	EF-02			Y					IW-18
	1 1/2"HDPE-2190	1 1/2"HDPE-2180 (IW-18) TO 1 1/2"HDPE2200 (IW-20)	MP-01, 06	EF-03			Y					IW-19
	1 1/2"CS-2194	2"CS-2190 TO WELL	MP-06	EF-03			Y					IW-19
	1 1/2"HDPE-2200	2"HDPE-2190 (IW-19) TO 2"HDPE2210 (IW-21)	MP-01, 07	EF-03			Y					IW-20
	1 1/2"CS-2204	2"CS-2200 TO WELL	MP-07	EF-03			Y					IW-20
	2"HDPE-2210	2"HDPE-2200 (IW-20) TO 2"HDPE2220 (IW-22)	MP-01, 07	EF-03			Y					IW-21
	1 1/2"CS-2214	2"CS-2210 TO WELL	MP-07	EF-03			Y					IW-21
	2"HDPE-2220	1 1/2"HDPE-2210 (IW-21) TO END	MP-01, 07	EF-04			Y					IW-22
	1 1/2"CS-2224	2"CS-2220 TO WELL	MP-07	EF-04			Y					IW-22

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

WARNING: ALTERING THIS DOCUMENT IS IN VIOLATION OF THE NEW YORK STATE EDUCATION LAW EXCEPTING AS PROVIDED IN SECTION 7209, PART 2 OF THE LAW.

HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

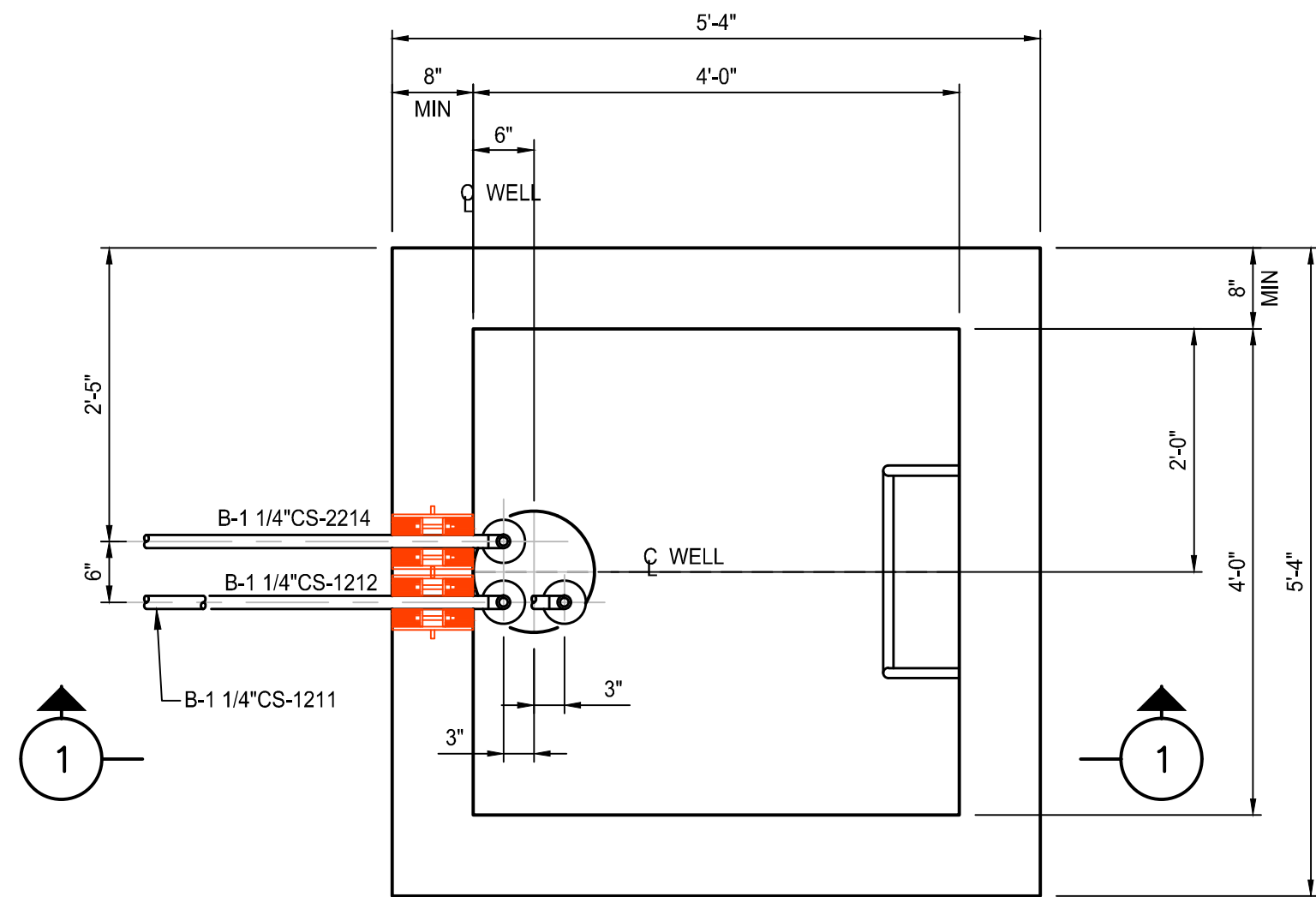
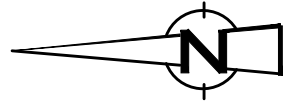
LINE LIST



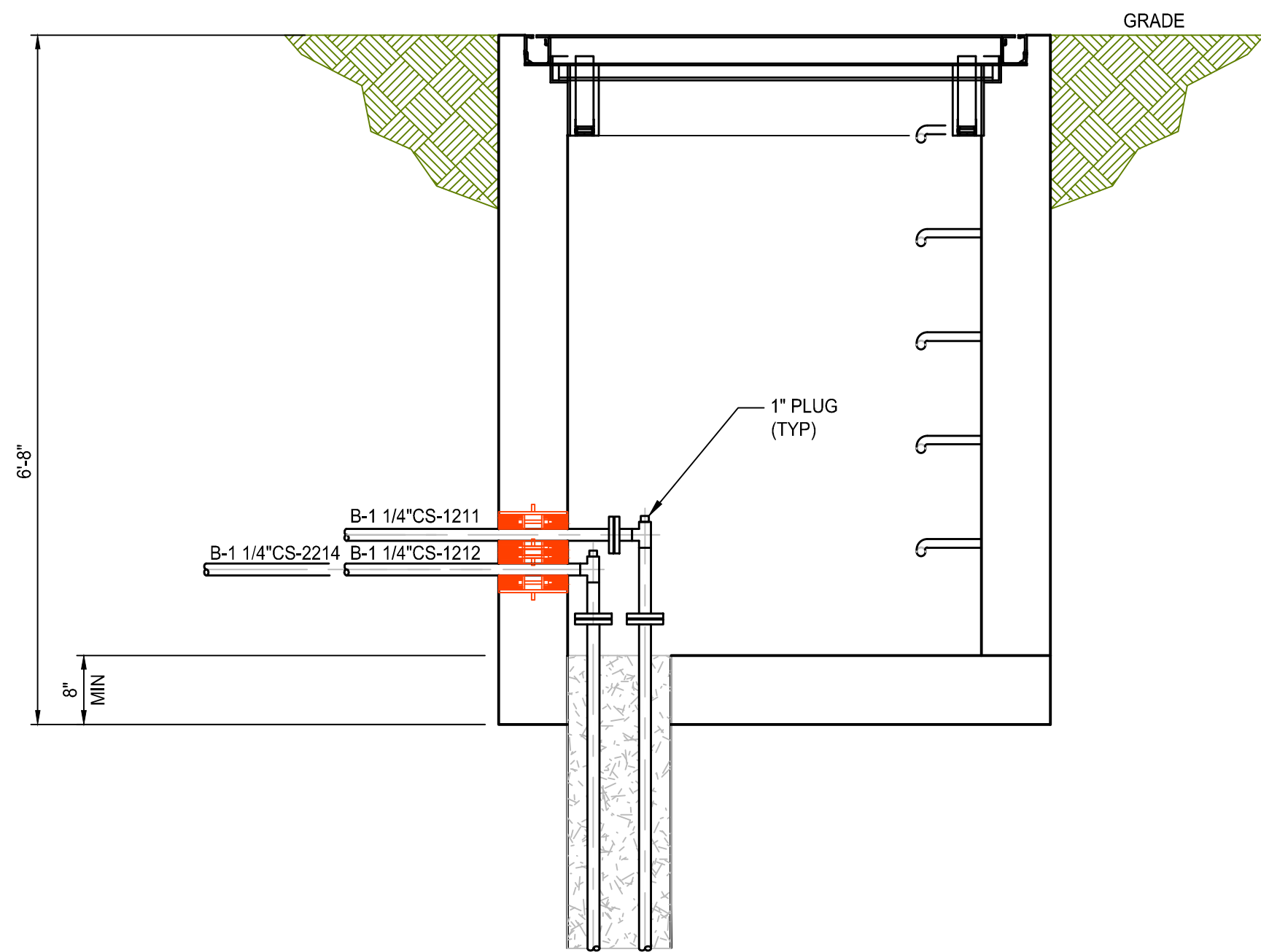
**CRA Infrastructure & Engineering, Inc.**

Source Reference:			Date: SEPTEMBER 2003
Project Manager: J. KAY	Reviewed By:	Designed By: B. A. BEEBE	Drawn By: B. A. BEEBE
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: MP-12





PLAN VIEW



SECTION 1

AS BUILT  
RECORD DRAWING

- NOTES:
1. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
  2. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
  3. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

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HICKSVILLE, NEW YORK

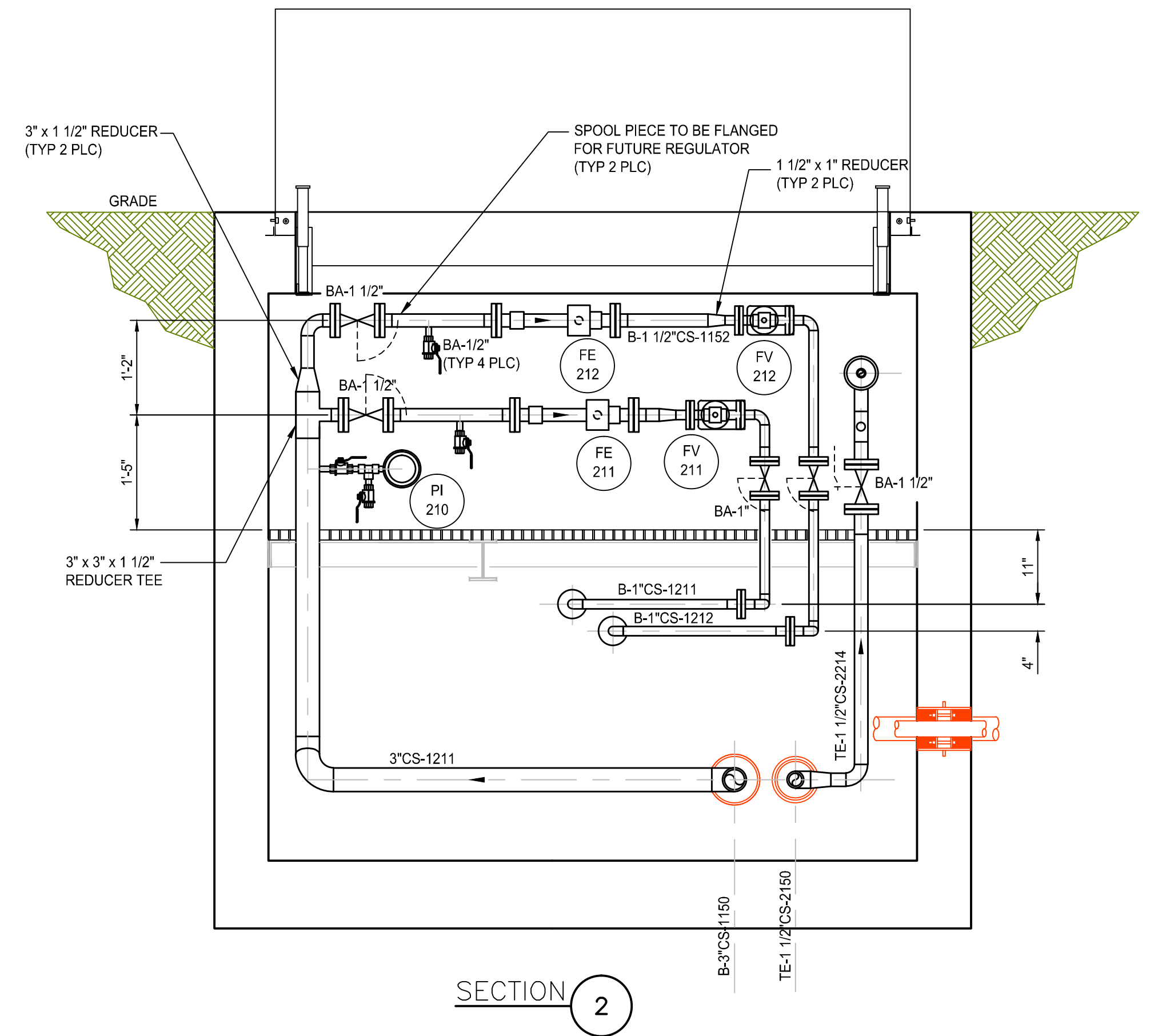
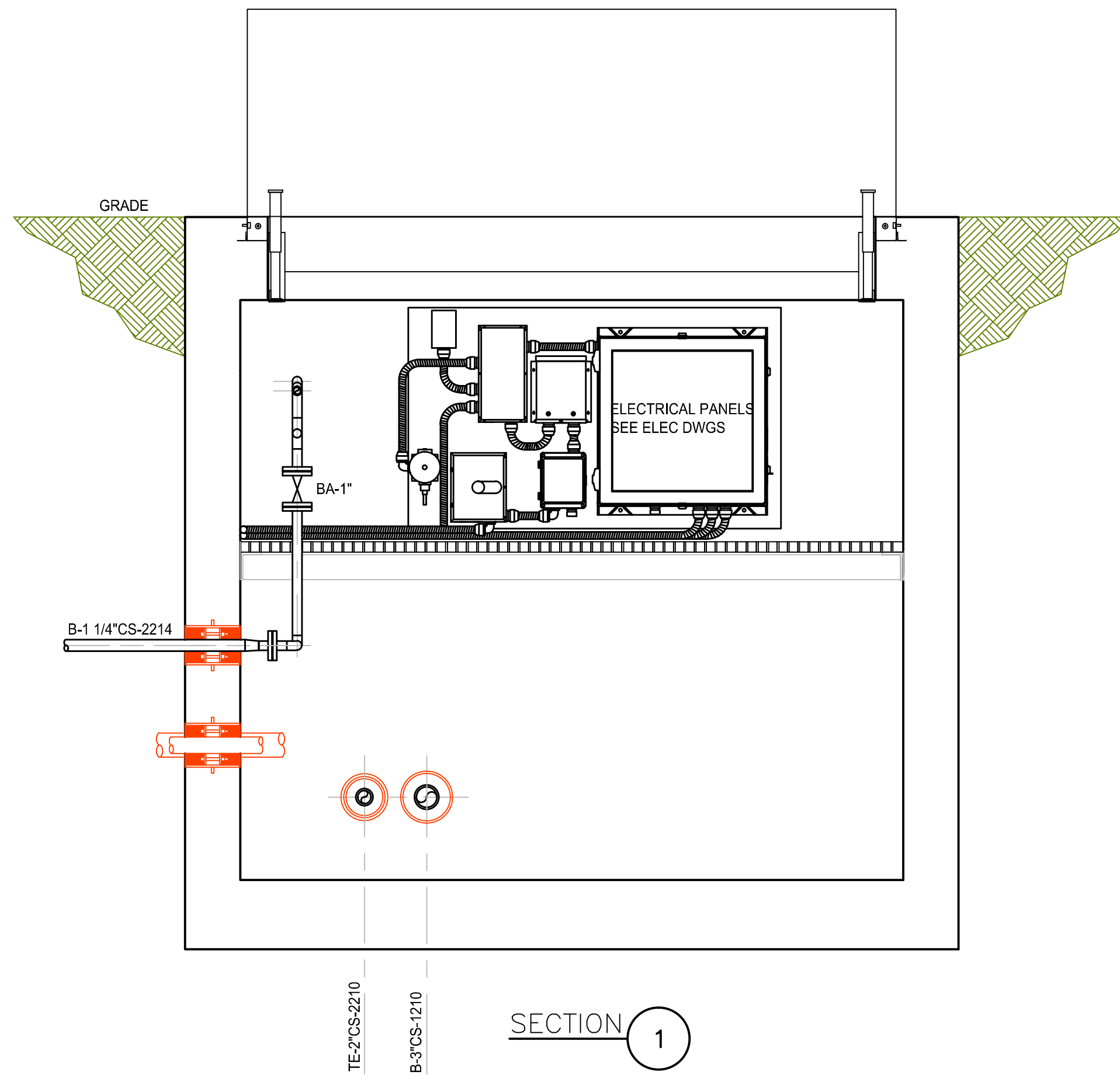
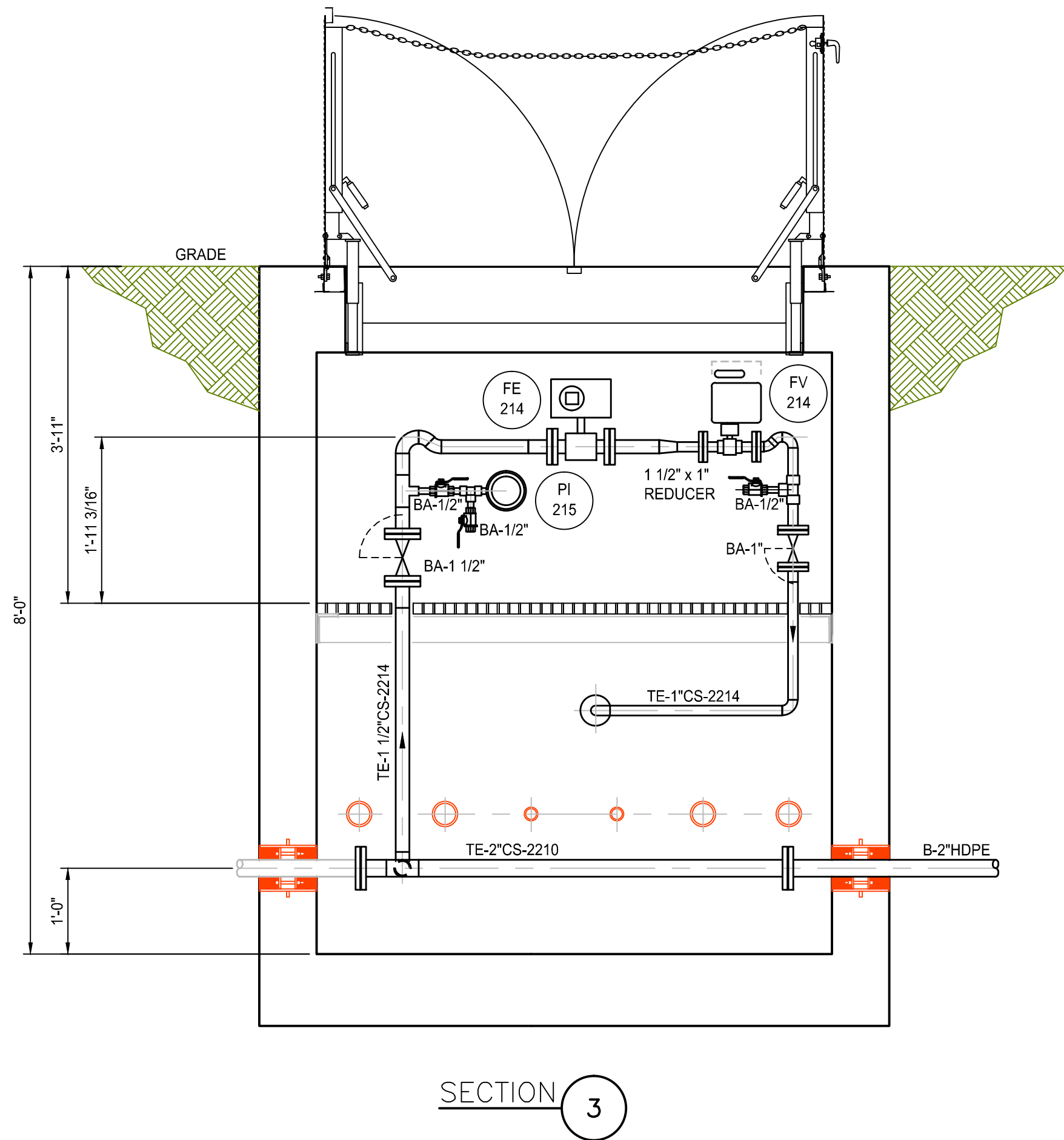
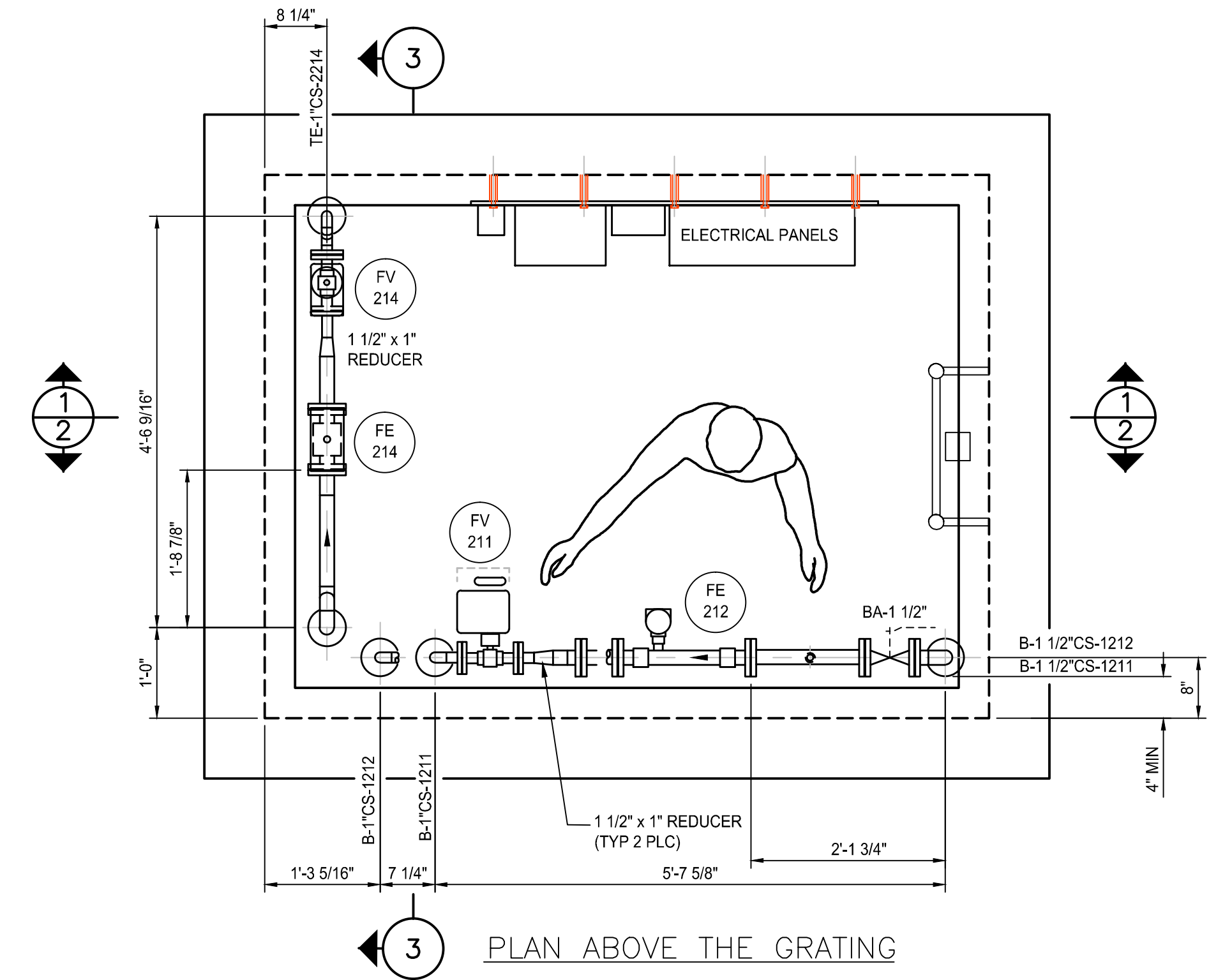
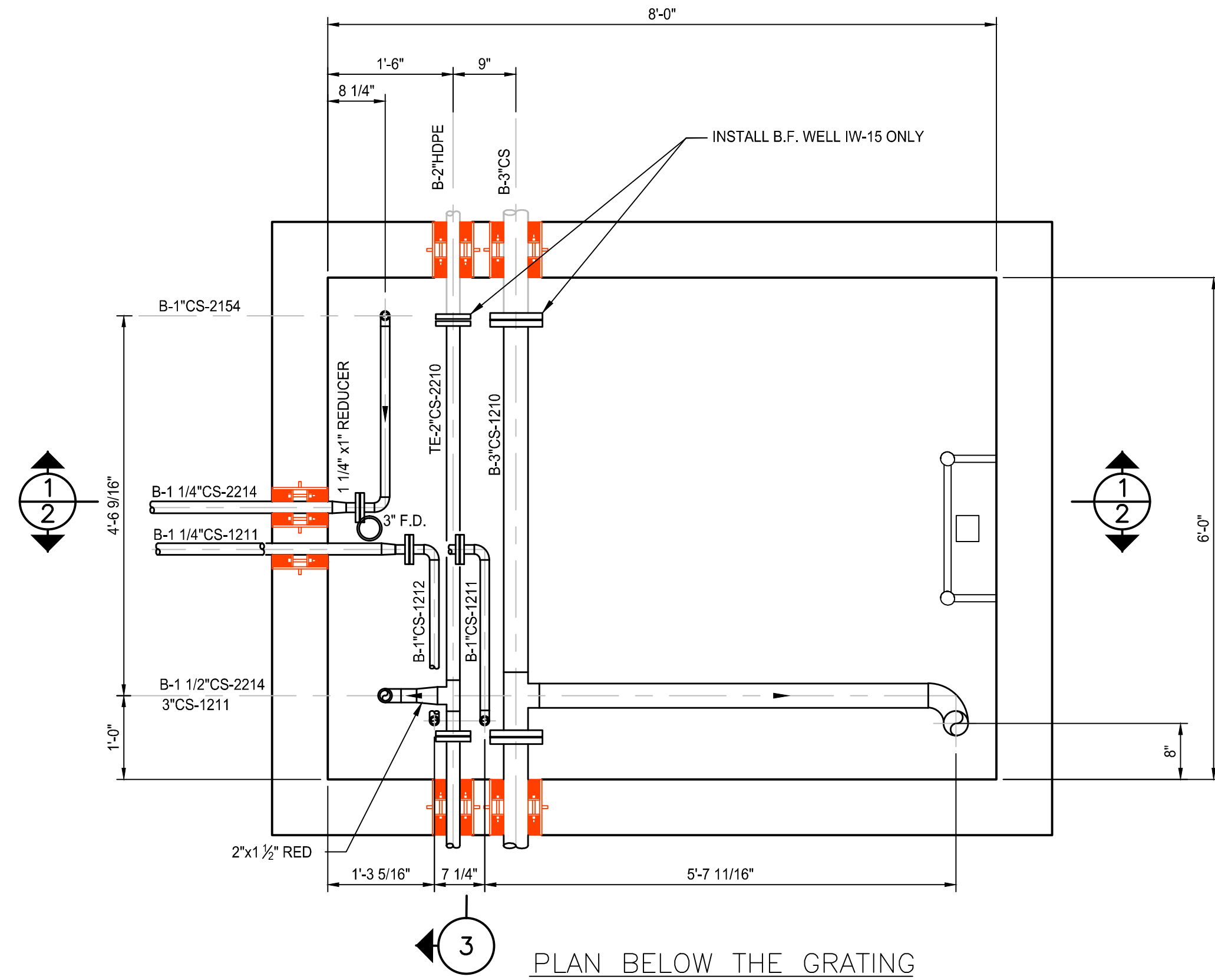
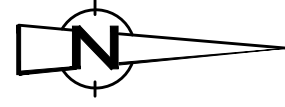
BIOSPARGE TREATMENT SYSTEM

INJECTION WELLS IW-21A  
PLAN AND SECTIONS



**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:			Date: 7-23-03
Project Manager: J. KAY	Reviewed By:	Designed By: B. A. BEEBE	Drawn By: B. A. BEEBE
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: MP-13



AS BUILT  
RECORD DRAWING

- NOTES:
1. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
  2. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
  3. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

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HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

INJECTION WELLS IW-21  
PLAN AND SECTIONS

**CRA Infrastructure & Engineering, Inc.**

Source Reference:	Date:	7-23-03
Project Manager: J. KAY	Reviewed By: B. A. BEEBE	Designed By: B. A. BEEBE
Scale: NONE	Project No: 06883-00	Report No: 056
		Drawing No: MP-14

DRAWING INDEX			
DWG. N °	REV. N °	DATE	TITLE
CIVIL / STRUCTURAL			
CI-02	1	08/29/12	INJECTION WELL SITE PLAN
CI-03	1	08/29/12	INJECTION WELLS IW - 16, 17, 18, 19
CI-04	1	08/29/12	MISC. SECTIONS AND DETAILS SECTIONS AND DETAILS
CI-05	1	08/29/12	INJECTION WELLS IW - 1 THROUGH IW-7, AND CH - 8
CI-06	1	08/29/12	INJECTION WELLS IW - 15, 20, 21, 22
ST-01	1	08/29/12	CONTROL BUILDING - GENERAL NOTES
ST-02	1	08/29/12	CONTROL BUILDING - FLOOR PLAN
ST-03	1	08/29/12	CONTROL BUILDING - ELEVATIONS
ST-04	1	08/29/12	CONTROL BUILDING - SECTION AND DETAILS
ST-05	1	08/29/12	CONTROL BUILDING - SCHEDULE & DETAILS
ST-06	1	08/29/12	CONTROL BUILDING - FOUNDATION PLAN
ST-07	1	08/29/12	CONTROL BUILDING - MISCELLANEOUS DETAILS
ENGINEERING FLOW SHEETS			
EF-00	1	08/29/12	ENGINEERING FLOW SHEET - LEGEND
EF-01 S1	1	08/29/12	ENGINEERING FLOW SHEET - PROCESS EQUIPMENT
EF-01 S2	1	08/29/12	ENGINEERING FLOW SHEET - PROCESS EQUIPMENT
EF-02	1	08/29/12	ENGINEERING FLOW SHEET - MIDDLE FENCE INJECTION WELLS
EF-03	1	08/29/12	ENGINEERING FLOW SHEET - MIDDLE FENCE INJECTION WELLS
EF-04	1	08/29/12	ENGINEERING FLOW SHEET - MIDDLE FENCE INJECTION WELLS
EF-05	1	08/29/12	ENGINEERING FLOW SHEET - MIDDLE FENCE INJECTION WELLS
EF-06	1	08/29/12	ENGINEERING FLOW SHEET - NORTH FENCE INJECTION WELLS
EF-07	1	08/29/12	ENGINEERING FLOW SHEET - NORTH FENCE INJECTION WELLS
EF-08	1	08/29/12	ENGINEERING FLOW SHEET - NORTH FENCE INJECTION WELLS
MECHANICAL / PIPING			
MP-01	1	08/29/12	CONTROL BUILDING AND WELL - FIELD PIPING PLAN
MP-02	1	08/29/12	CONTROL BUILDING - EQUIPMENT LAYOUT AT GRADE
MP-03	1	08/29/12	CONTROL BUILDING - EQUIPMENT LAYOUT (UPPER)
MP-04	1	08/29/12	CONTROL BUILDING - EQUIPMENT SECTIONS
MP-05	1	08/29/12	WELL DETAILS
MP-06	1	08/29/12	INJECTION WELLS IW-16, 17 ,18 & 19 - PLAN AND SECTIONS
MP-07	1	08/29/12	INJECTION WELLS IW-15, 20 AND 22 - PLAN AND SECTIONS
MP-08	1	08/29/12	LAVATORY PLUMBING
MP-09	1	08/29/12	INJECTION WELL IW-08 - PLAN AND SECTIONS
MP-10	1	08/29/12	INJECTION WELLS IW-01 THRU IW-07 - PLAN AND SECTIONS
MP-11			REMOVED
MP-12	1	08/29/12	LINE LIST
MP-13	1	08/29/12	INJECTION WELLS IW-21A - PLAN AND SECTIONS
MP-14	1	08/29/12	INJECTION WELLS IW-21 - PLAN AND SECTIONS
ELECTRICAL / INSTRUMENTATION (NOT INCLUDED - TO BE PROVIDED AT LATER DATE)			
E-01	1	08/29/12	ELECTRICAL/INSTRUMENTATION SITE PLAN
E-02	1	08/29/12	CONTROL BUILDING SINGLE LINE DIAGRAM
E-03	1	08/29/12	CONTROL BUILDING - GROUNDING PLAN AND DETAILS
E-04	1	08/29/12	CONTROL BUILDING - LIGHTING PLAN AND DETAILS
E-05	1	08/29/12	CONTROL BUILDING - PANELBOARD SCHEDULES
E-06	1	08/29/12	CONTROL BUILDING POWER PLAN
E-07 SHT. 1	1	08/29/12	CONTROL BUILDING MOTOR SCHEMATIC DIAGRAMS
E-07 SHT. 2	1	08/29/12	CONTROL BUILDING MOTOR SCHEMATIC DIAGRAMS
E-08	1	08/29/12	CONTROL SYSTEM NETWORK ARCHITECTURE
E-09	1	08/29/12	CONTROL BUILDING INSTRUMENTATION PLAN AND DETAILS
E-10	1	08/29/12	MAIN PLC CONTROL PANEL ARRANGEMENT
E-11 SHT. 1	1	08/29/12	MAIN PLC CONTROL PANEL WIRING DIAGRAM
E-11 SHT. 2	1	08/29/12	MAIN PLC CONTROL PANEL ANALOG INPUT WIRING DIAGRAM
E-11 SHT. 3	1	08/29/12	MAIN PLC CONTROL PANEL ANALOG OUTPUT WIRING DIAGRAM
E-11 SHT. 4	1	08/29/12	MAIN PLC CONTROL PANEL DIGITAL INPUT WIRING DIAGRAM (1 OF 2)
E-11 SHT. 5	1	08/29/12	MAIN PLC CONTROL PANEL DIGITAL INPUT WIRING DIAGRAM (2 OF 2)
E-11 SHT. 6	1	08/29/12	MAIN PLC CONTROL PANEL DIGITAL OUTPUT WIRING DIAGRAM
E-12	1	08/29/12	INJECTION WELLS PLAN, SECTION & DETAILS
E-13	1	08/29/12	INJECTION WELLS HEAT TRACING PLAN, SECTION & DETAILS
E-14	1	08/29/12	INJECTION WELLS TYPICAL ELECTRICAL WIRING DIAGRAM
E-15	1	08/29/12	TYPICAL INJECTION WELL REMOTE I/O PANEL ARRANGEMENT
E-16 SHT. 1	1	08/29/12	INJECTION WELL IW-1 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 2	1	08/29/12	INJECTION WELL IW-2 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 3	1	08/29/12	INJECTION WELL IW-3 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 4	1	08/29/12	INJECTION WELL IW-4 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 5	1	08/29/12	INJECTION WELL IW-5 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 6	1	08/29/12	INJECTION WELL IW-6 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 7	1	08/29/12	INJECTION WELL IW-7 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 15	1	08/29/12	INJECTION WELL IW-15 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 16	1	08/29/12	INJECTION WELL IW-16 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 17	1	08/29/12	INJECTION WELL IW-17 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 18	1	08/29/12	INJECTION WELL IW-18 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 19	1	08/29/12	INJECTION WELL IW-19 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 20	1	08/29/12	INJECTION WELL IW-20 REMOTE I/O PANEL WIRING DIAGRAM
E-16 SHT. 22	1	08/29/12	INJECTION WELL IW-22 REMOTE I/O PANEL WIRING DIAGRAM

HOOKER/RUCO SITE

HICKSVILLE, NEW YORK

BIOSPARGE

TREATMENT SYSTEM

MIDDLE AND NORTH INJECTION FENCE

UNDERGROUND VAULTS

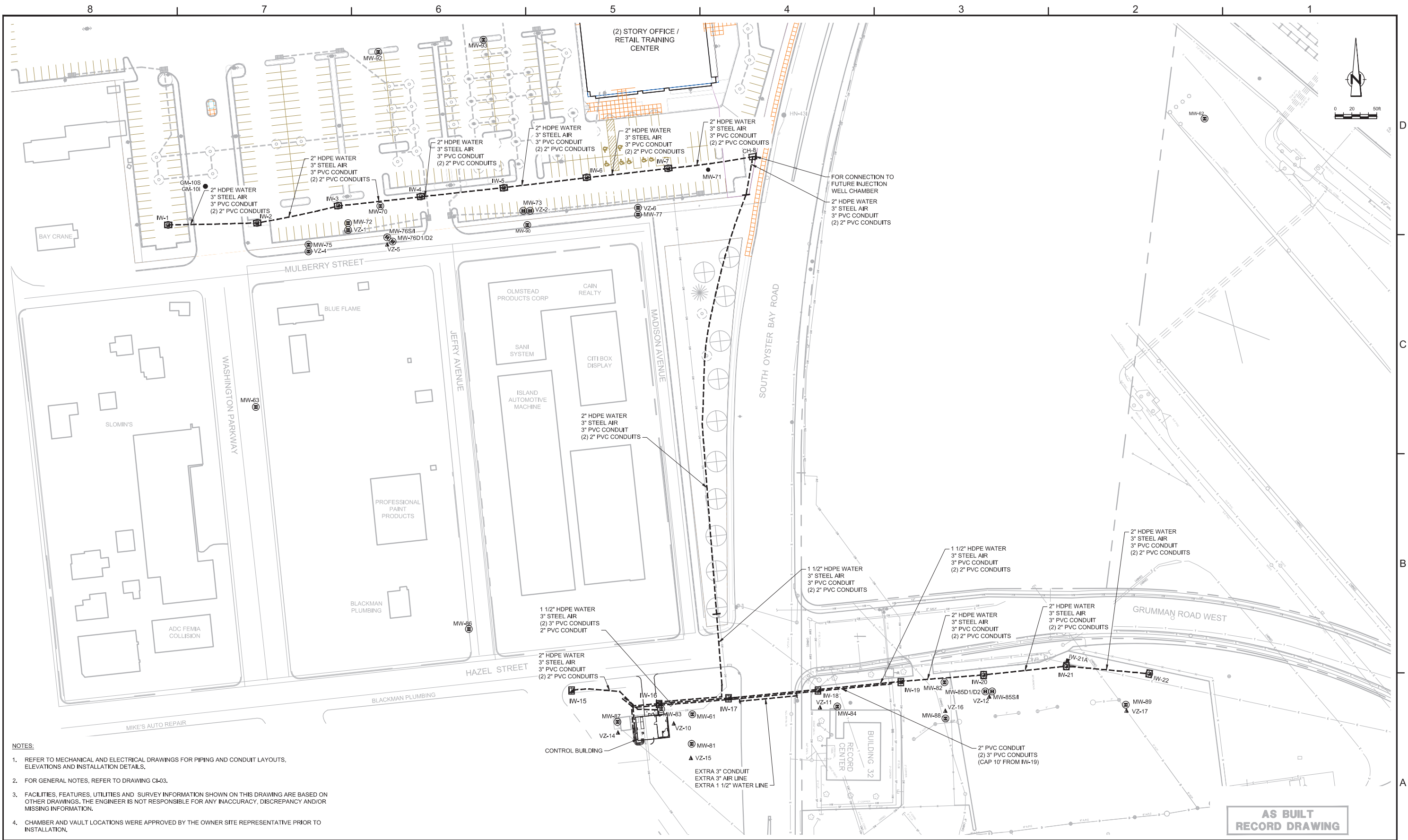
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06883-00(056)



CRA Infrastructure  
& Engineering, Inc.





- NOTES:
1. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR PIPING AND CONDUIT LAYOUTS, ELEVATIONS AND INSTALLATION DETAILS.
  2. FOR GENERAL NOTES, REFER TO DRAWING CI-03.
  3. FACILITIES, FEATURES, UTILITIES AND SURVEY INFORMATION SHOWN ON THIS DRAWING ARE BASED ON OTHER DRAWINGS. THE ENGINEER IS NOT RESPONSIBLE FOR ANY INACCURACY, DISCREPANCY AND/OR MISSING INFORMATION.
  4. CHAMBER AND VAULT LOCATIONS WERE APPROVED BY THE OWNER SITE REPRESENTATIVE PRIOR TO INSTALLATION.

- LEGEND
- FORCEMAIN AND CONDUIT ALIGNMENT
  - IW-6 INJECTION WELL LOCATION
  - MW-50 MONITORING WELL LOCATION
  - MW-78 MONITORING WELL NEST AND VADOSE ZONE
  - VZ-7 MONITORING WELL NEST LOCATION
  - CHAMBER

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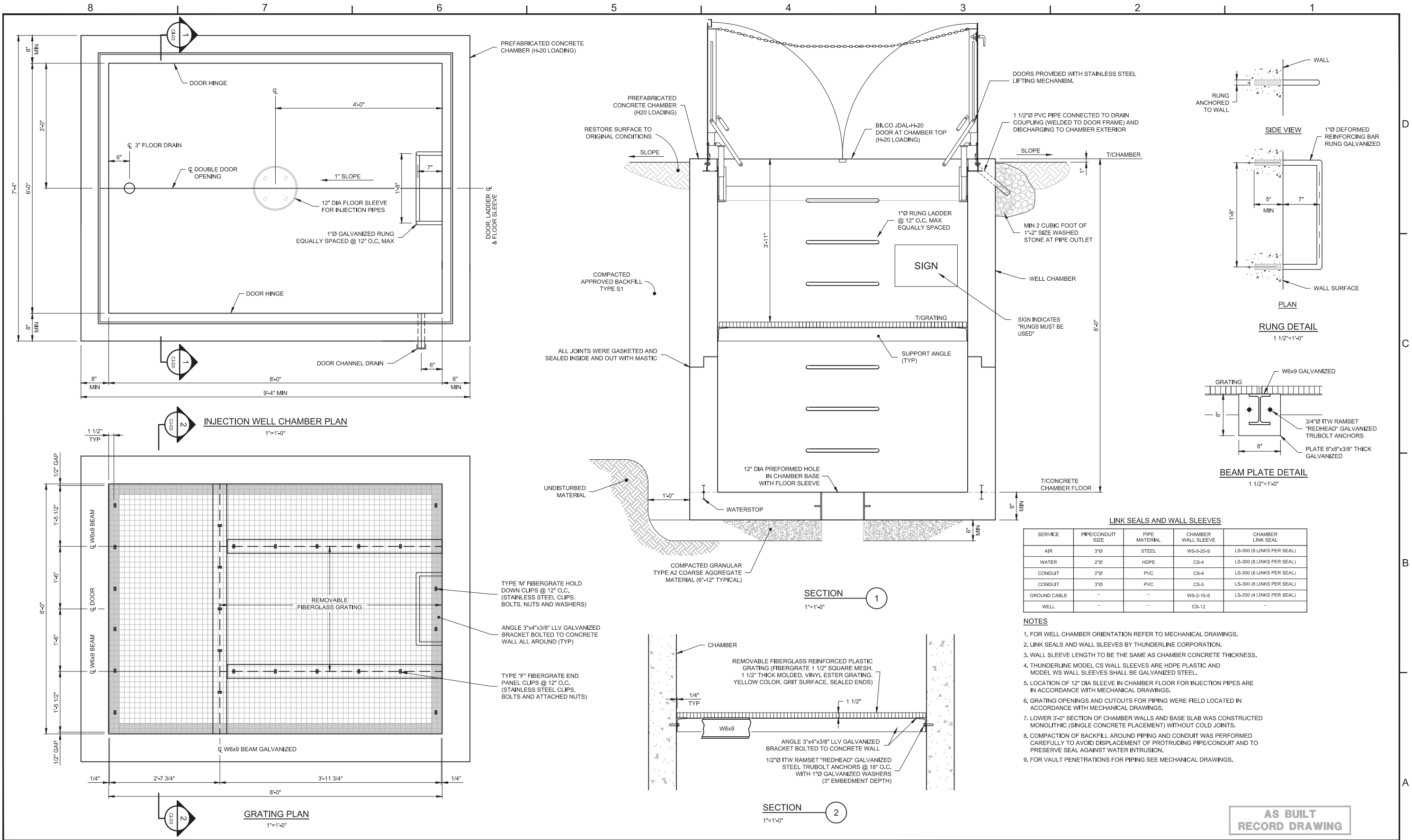
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HOOKE/ RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

INJECTION WELL SITE PLAN

		<b>CRA Infrastructure &amp; Engineering, Inc.</b>	
Source Reference:		Date: SEPTEMBER 2003	
Project Manager: J. KAY	Reviewed By: J. WORRALL	Designed By: J. THORNTON	Drawn By: C. ROHRICH
Scale: AS NOTED	Project No: 06883-00	Report No: 056	Drawing No: CI-02



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HOOKER/ RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

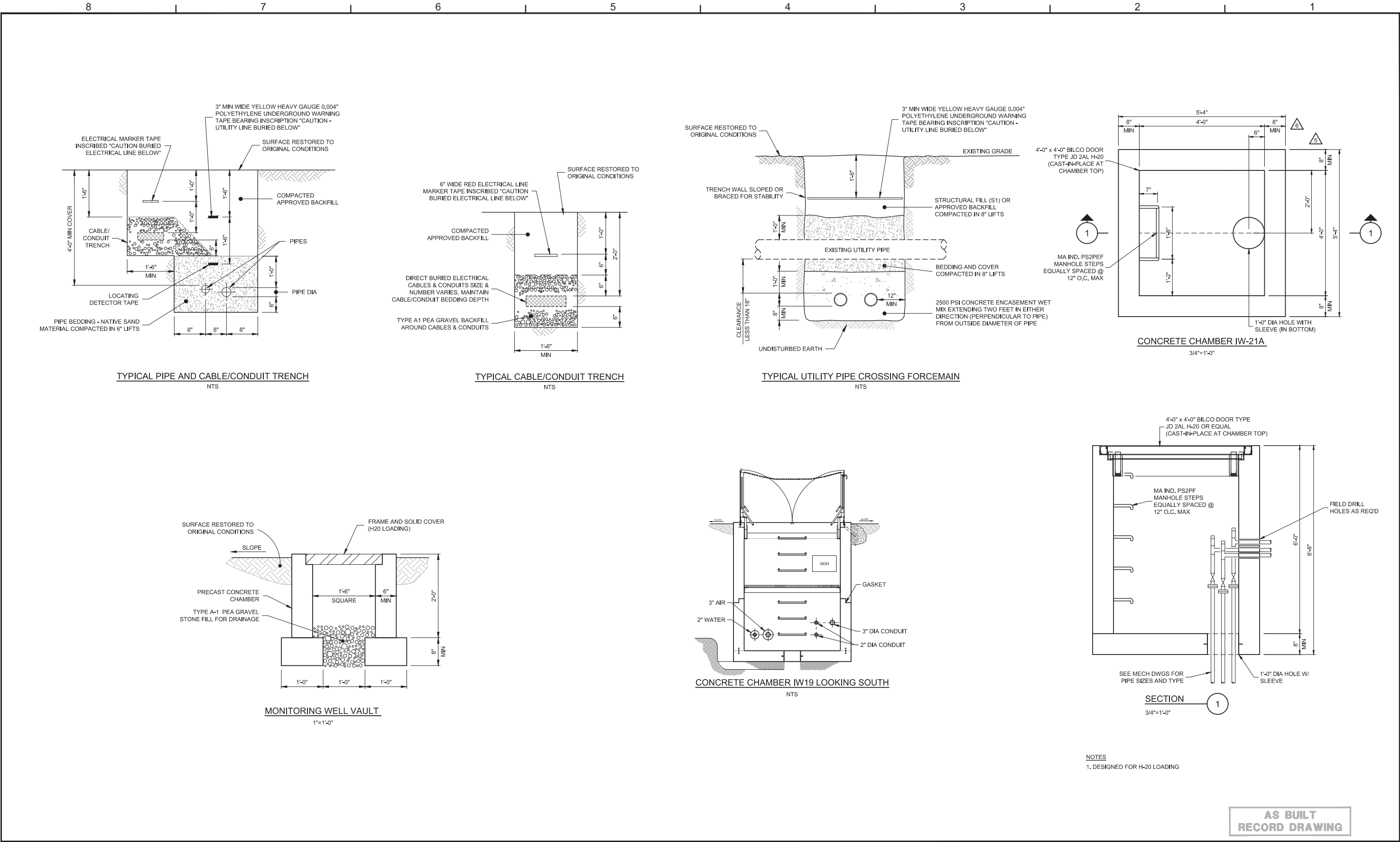
INJECTION WELLS  
IW - 16, 17, 18, 19


**CRA Infrastructure & Engineering, Inc.**

Source Reference: \_\_\_\_\_ Date: SEPTEMBER 2003

Project Manager:	Reviewed By:	Designed By:	Drawn By:
J. KAY	J. WORRALL	J. THORNTON	C. ROHRICH

Scale:	Project No:	Report No:	Drawing No:
AS NOTED	06883-00	056	CI-03



				SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.								HOOKER/ RUCO SITE HICKSVILLE, NEW YORK				 <b>CRA Infrastructure &amp; Engineering, Inc.</b>																			
												BIOSPARGE TREATMENT SYSTEM								Source Reference:				Date: SEPTEMBER 2003											
												MISC. SECTIONS AND DETAILS								Project Manager: J. KAY				Reviewed By: J. WORRALL				Designed By: J. THORNTON				Drawn By: C. ROHRICH			
																				Scale: AS NOTED				Project No: 06883-00				Report No: 056				Drawing No: CI-04			
				1 AS BUILT				08/29/12				JA																							
				No				Revision				Date				Initial																			







GENERAL NOTES

1. THE CONTRACTOR SHALL NOT SCALE THE DRAWINGS TO ESTABLISH DIMENSIONS. ALL DIMENSIONS SHALL BE CHECKED ON-SITE PRIOR TO ASSEMBLY OR CONSTRUCTION OF ANY WORK.
2. THE STRUCTURE HAS BEEN DESIGNED FOR THE IN-SERVICE LOADS. THE METHODS, PROCEDURES AND SEQUENCES OF CONSTRUCTION TO BE USED ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. SUPPORTING FORMWORK FOR CONCRETE CONSTRUCTION SHALL NOT BE REMOVED BEFORE THE CONCRETE HAS GAINED SUFFICIENT STRENGTH TO SAFELY SUPPORT THE DEAD AND SUPERIMPOSED LOADS. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID OVERLOADS, AND MAINTAIN AND INSURE THE INTEGRITY OF THE STRUCTURE AT ALL STAGES OF CONSTRUCTION.
3. THE CONTRACTOR SHALL REFER TO MECHANICAL & ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR SIZE AND LOCATION OF SLEEVES, ANCHORS, INSERTS AND OPENINGS REQUIRED.
4. PRINCIPAL OPENINGS IN THE STRUCTURE ARE SHOWN ON THE DRAWINGS. SLEEVES AND OPENINGS NOT SHOWN ON STRUCTURAL DRAWINGS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
5. MATERIALS SPECIFIED ON THE DRAWINGS AND/OR IN THE SPECIFICATIONS SHALL BE USED UNLESS THE CONTRACTOR OBTAINS WRITTEN APPROVAL OF THE ENGINEER TO USE ALTERNATIVE MATERIALS. WHEN REQUESTING SUCH APPROVAL, THE CONTRACTOR SHALL PROVIDE ADEQUATE AND DETAILED MANUFACTURER'S LITERATURE AND TECHNICAL DATA FOR EACH MATERIAL PRIOR TO ITS POTENTIAL USE.

CONCRETE NOTES

1. CONCRETE CONSTRUCTION SHALL CONFORM TO ACI 301, 305, 306, 308, 315, 318 AND 350R SPECIFICATIONS.
2. LATEST REVISION AND/OR VERSION OF ALL CODES AND REFERENCE STANDARDS SHALL BE FOLLOWED.
3. CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS. SLUMP SHALL BE 3 1/2 INCHES ± 1 INCH.
4. CONCRETE SHALL BE AIR ENTRAINED. CEMENT SHALL BE PORTLAND CEMENT CONFORMING TO ASTM C150, TYPE II WITH AIR-ENTRAINING ADMIXTURE CONFORMING TO ASTM C260. AIR CONTENT (% BY VOLUME) SHALL NOT BE LESS THAN 4% NOR GREATER THAN 6.5% AND SHALL DEPEND ON MAXIMUM SIZE AGGREGATE USED.
5. NO ADMIXTURE SHALL CONTAIN CALCIUM CHLORIDE BASED COMPOUNDS. FLYASH AND POZZOLAN CONTENT SHALL NOT EXCEED 20% BY WEIGHT OF CEMENT.
6. REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS.
7. LAP SPLICES IN REINFORCING BARS SHALL BE A MINIMUM 38 TIMES BAR DIAMETERS. THE SPLICES SHALL NOT BE LESS THAN 18 INCHES.
8. CONCRETE PROTECTION FOR REINFORCING BARS (UNLESS OTHERWISE NOTED):  
A. FOOTINGS - 3 INCH BOTTOM AND SIDES, 2 INCH TOP  
B. GRADE BEAMS - 2 INCH BOTTOM AND SIDES, 1 1/2 INCH TOP (TO STIRRUPS)  
C. PIERS - 1 1/2 INCH (TO TIES)  
D. FORMED SLABS - 1 1/2 INCH TOP AND BOTTOM  
E. WALLS AND PADS - 2 INCH  
F. EXTERIOR SLABS ON FILL - 2 1/2 INCH BOTTOM, 2 INCH TOP  
G. INTERIOR SLABS ON FILL - 2 1/2 INCH BOTTOM, 1 1/2 INCH TOP
9. ANCHOR BOLTS SHALL BE CARBON STEEL CONFORMING TO ASTM A307 SPECIFICATIONS. WITH HEAVY HEX NUTS AND WASHERS. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED CONFORMING TO ASTM A123 AND A153 SPECIFICATIONS, AND SHALL BE ACCURATELY PLACED USING TEMPLATES.
10. NO CONSTRUCTION JOINT SHALL BE MADE UNLESS SHOWN ON DRAWINGS OR APPROVED IN WRITING BY THE ENGINEER.
11. GROUT IN DRILLED HOLES FOR ANCHOR BOLTS AND REINFORCING STEEL DOWELS, AND UNDER BASE PLATES SHALL BE NON-SHRINK NON-METALLIC "MASTERFLOW 713" OR "MASTERFLOW 928" BY DEGUSSA BUILDING SYSTEMS. MANUFACTURER'S INSTRUCTIONS CONCERNING HOLE SIZE, SURFACE PREPARATION AND INSTALLATION SHALL BE FOLLOWED.
12. EDGE TOOL TOP HORIZONTAL EDGES OF PIERS, EQUIPMENT (PUMP) PADS, OTHER EXPOSED EDGES SHALL HAVE 3/4 INCH CHAMFER.
13. RAMPS, PADS AND SLABS SHALL BE TROWEL FINISHED TO WITHIN 1/8 INCH OF ELEVATIONS SHOWN ON DRAWINGS, FOLLOWING TROWELLING, PROVIDE NON-SLIP MEDIUM BROOM FINISH.
14. PROVIDE CORNER BARS TO MATCH HORIZONTAL BARS AT ALL EXTERIOR CORNERS.
15. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A82 AND A185 SPECIFICATIONS.
16. PROVIDE MINIMUM OF 6 INCH MECHANICALLY COMPACTED CRUSHED STONE UNDER SLABS AND WHERE OTHERWISE NOTED ON DRAWINGS.
17. JOINT SEALANT SHALL BE ONE-COMPONENT POLYURETHANE "SIKAFLEX-1A" BY SIKA CHEMICAL CORPORATION.
18. WATERSTOPS SHALL BE 6 INCH FLAT RIBBED PVC WATERSTOPS R6-316 OR 4 INCH RIBBED CENTER BULB PVC WATERSTOPS RB4-316 BY VINYLEX CORPORATION. WATERSTOPS SHALL BE HEAT FUSED AT ALL JOINTS.
19. PERIMETER FOUNDATION WALL RIGID INSULATION SHALL BE STYROFOAM SQUARE EDGE BY DOW CHEMICAL COMPANY; AND LATEX MODIFIED CONCRETE FACING, TONGUE AND GROOVE FORMAT, WITH GALVANIZED CLIPS AND FASTENERS.
20. PRIOR TO CASTING CONCRETE PADS AND PIERS, BASE SLAB AND WALL SHALL BE ROUGHENED, CLEANED AND COATED WITH A CONCRETE BONDING AGENT. BONDING AGENT SHALL BE "CONCRESEIVE LIQUID (LPL)" OR "CONCRESEIVE PASTE (LPL)" BY DEGUSSA BUILDING SYSTEMS. MANUFACTURER'S INSTRUCTIONS CONCERNING SURFACE PREPARATION AND APPLICATION SHALL BE FOLLOWED.

STRUCTURAL STEEL NOTES

1. FABRICATION, ERECTION AND WORKMANSHIP SHALL CONFORM TO THE DESIGN DRAWINGS, SCOPE OF WORK AND SPECIFICATIONS, AND SHALL BE IN ACCORDANCE WITH THE AISC SPECIFICATIONS.
2. LATEST REVISION AND/OR VERSION OF ALL CODES AND REFERENCE STANDARDS SHALL BE FOLLOWED.
3. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 SPECIFICATIONS, STRUCTURAL TUBING SHALL CONFORM TO ASTM A500 GRADE B WITH YIELD STRESS OF 46 KSI.
4. ALL DIMENSIONS SHALL BE FIELD CHECKED BEFORE FABRICATION MAY BEGIN.
5. WELDING SHALL BE IN ACCORDANCE WITH THE AWS STRUCTURAL WELDING CODE. WELDED CONNECTIONS SHALL BE MADE WITH E70XX ELECTRODES, ROOT PASS AND TACK WELDS SHALL BE MADE WITH E8010 ELECTRODES. FILLET WELDS ON STANDARD FRAMED BEAM CONNECTIONS MAY BE 3/16 INCH MINIMUM. ALL OTHER FILLET WELDS SHALL BE 1/4 INCH MINIMUM.
6. GUSSET PLATES AND CLIP ANGLES SHALL BE 5/16 INCH THICK MINIMUM (UNLESS OTHERWISE NOTED). GENERALLY, ONE-SIDED CONNECTIONS FOR BEAMS SHALL NOT BE USED.
7. SHOP CONNECTIONS MAY BE EITHER WELDED OR BOLTED. FIELD CONNECTIONS SHALL BE BOLTED (UNLESS OTHERWISE NOTED). CONNECTIONS FOR NEW STEEL FRAMING TO EXISTING STEEL SHALL HAVE ONE END OF MEMBER BOLTED TO ALLOW FOR ADJUSTMENTS. WELDED CONNECTIONS, FIELD AND SHOP, SHALL BE CONTINUOUS FULL PENETRATION SEAL WELDS.
8. FASTENERS SHALL BE HIGH STRENGTH ASTM A325-N, 3/4 INCH DIAMETER GALVANIZED BOLTS WITH ASTM A194 GRADE 2H OR A563 GRADE DH NUTS TAPPED OVERSIZE AFTER GALVANIZING AND THREADS LUBRICATED. HARDENED WASHERS SHALL BE PROVIDED UNDER ROTATING PART OF NUT AND BOLT ASSEMBLY. CONNECTIONS NOTED WITH A325-SC BOLTS SHALL BE SLIP CRITICAL PER AISC SPECIFICATIONS.
9. BOLT HOLES SHALL NOT BE LARGER THAN 1/16 INCH PLUS DIAMETER OF THE BOLT. A MINIMUM OF TWO BOLTS PER CONNECTION SHALL BE REQUIRED.
10. WHERE BRACING FORCES ARE NOT GIVEN, DESIGN CONNECTIONS AT EACH END FOR 50% OF MEMBER CAPACITY IN TENSION.
11. ALL STRUCTURAL STEEL FRAMES INCLUDING GIRTS, PURLINS, MISCELLANEOUS STEEL, DOOR/ WINDOW/OPENING FRAMES, DOORS, COMBINATION LOUVER/DAMPER AND SHUTTERS SHALL BE PAINTED.
12. PAINT SHALL CONSIST OF ONE COAT PRIMER (6 MILS DFT) EPOXY BAR-RUST 235 AND ONE COAT FINISH (2 MILS DFT) ALIPHATIC URETHANE DEVTHANE 379 BY ICI DULUX-DEVOE COATINGS.

FOUNDATION NOTES

1. FOUNDATION DESIGN IS BASED UPON A NET ALLOWABLE SOIL BEARING CAPACITY OF 3,000 POUNDS PER SQUARE FOOT FOR FOOTINGS BEARING ON APPROVED NATIVE SUBGRADE SOILS OR COMPACT STRUCTURAL GRANULAR FILL.
2. CONTRACTOR SHALL FIELD VERIFY THE FOUNDATION BEARING GRADE MATERIAL AND BEARING CAPACITY DURING CONSTRUCTION. FOUNDATIONS SHALL BE PLACED ON APPROVED BEARING GRADE.
3. NO FOOTING SHALL BEAR ON EXISTING FILL, SOFT/LOOSE, ORGANIC OR OTHER UNSUITABLE SOILS. IF ENCOUNTERED, THE EXISTING FILL AND UNSUITABLE SOILS AT THE FOOTING BEARING GRADE LEVEL SHALL BE REMOVED DOWN TO COMPETENT NATIVE SUBGRADE AND EXCAVATION BACKFILLED WITH COMPACTED STRUCTURAL GRANULAR FILL IN ACCORDANCE WITH THE SPECIFICATION.
4. EXISTING UNDERGROUND PIPING, REINFORCED CONCRETE STRUCTURES, UTILITIES, ELECTRICAL CABLES AND GROUNDING SYSTEMS NOT IDENTIFIED ON THE DRAWINGS MAY EXIST. WHEN UNCOVERED, THE CONTRACTOR MUST REPORT FINDINGS TO THE ENGINEER FOR IDENTIFICATION AND RECOMMENDED ACTION.
5. BACKFILL AROUND PIPES AND CABLES AS PER SPECIFICATIONS, NO PIPES OR CONDUITS SHALL BE PLACED IN FOOTINGS.
6. WHERE PIPES OR CONDUITS RUN PERPENDICULAR TO A FOOTING, STEP THE TOP OF THE FOOTING DOWN TO ALLOW PIPES OR CONDUITS TO RUN OVER TOP OF THE FOOTING. WHERE PIPES OR CONDUITS RUN PARALLEL TO A FOOTING, STEP BOTTOM OF FOOTING DOWN SO THAT A LINE DRAWN BETWEEN THE INVERT OF PIPE OR CONDUIT AND BOTTOM OF FOOTING SHALL NOT EXCEED 30 DEGREES ABOVE THE HORIZONTAL. NO PIPING OR CONDUIT SHALL BE ALLOWED TO PASS WITHIN A 30-DEGREE PLANE OF INFLUENCE BELOW AND AWAY FROM FOOTINGS.
7. MAXIMUM WALL FOOTING STEP SHALL BE 1'-0" VERTICAL SPACED NOT LESS THAN 2'-0" ON CENTER.
8. BUILDING FOUNDATIONS OVER EXISTING UTILITY LINES SHALL BEAR ONLY ON COMPACTED STRUCTURAL FILL PLACED AFTER REMOVAL OF ALL UNCONTROLLED FILL AND UNSUITABLE SOILS.

ARCHITECTURAL NOTES

1. BUILDING SHALL CONSIST OF PRE-ENGINEERED METAL, CLEAR SINGLE SPAN RIGID FRAME WITH STRAIGHT COLUMNS (NON-TAPERED) AND GABLED ROOF BEAMS.
2. ROOF SHALL HAVE A 2:12 PITCH.
3. ROOF PANELS SHALL BE 24 GAUGE STANDING SEAM STEEL.
4. EXTERIOR WALL PANELS SHALL BE 26 GAUGE.
5. INTERIOR WALL LINER PANELS SHALL BE 28 GAUGE (STANDARD HEIGHT 8'-3").
6. BOTTOM OF STEEL BASE PLATE TO BE AT EL. 100'-7".
7. BUILDING SHALL HAVE A 6" HIGH CURB AND 1" GROUT UNDER STEEL BASE PLATES.
8. CUTOUTS AND HOLES IN WALL AND ROOF PANELS SHALL BE COMPLETELY SEALED BY MECHANICAL/ELECTRICAL CONTRACTORS WITH FIRE STOP AND WEATHER PROOF MATERIALS AFTER PIPE/DUCT/CABLE INSTALLATIONS.
9. PAINT FOR CONTROL ROOM GYPSUM BOARD WALL SHALL CONSIST OF ONE COAT PRIMER (1 MIL DFT) ULTRA-HIDE PVA (1030) AND ONE COAT FINISH (2 MILS DFT) ULTRA-HIDE LATEX ENAMEL (1416) BY ICI PAINT STORES.
10. FIRE EXTINGUISHERS:  
CONTROL ROOM - (2 NOS) CLASS C TYPE,  
OTHER AREAS - (1 NO) CLASS ABC TYPE.
11. BASED ON USE, BUILDING IS NOT INTENDED TO BE "ACCESSIBLE" PER CODE.

PRECAST CONCRETE NOTES

1. CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 5,000 PSI AT 28 DAYS.
2. AIR ENTRAINED CONCRETE:  
A. CONCRETE SHALL BE AIR ENTRAINED  
B. CEMENT SHALL BE PORTLAND CEMENT CONFORMING TO ASTM C150, TYPE II WITH AIR ENTRAINING ADMIXTURE CONFORMING TO ASTM C260. AIR CONTENT (% BY VOLUME) SHALL NOT BE LESS THAN 5% NOR GREATER THAN 7%.
3. REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS.
4. LAP SPLICES IN REINFORCING SHALL BE IN ACCORDANCE WITH ACI 318 SPECIFICATIONS. LAP SPLICES SHALL NOT BE LESS THAN 18 INCHES.
5. CONCRETE PROTECTION FOR REINFORCING BARS SHALL BE INDUSTRY OR DOT STANDARDS, UNLESS NOTED OTHERWISE.
6. DESIGN LOADING TO MEET AASHTO HS-20-44 WITH 30% IMPACT. FOR HYDROSTATIC PRESSURE AND UPLIFT FORCES, WATER TABLE SHALL BE CONSIDERED AT THE GROUND SURFACE.
7. LIFTING HOLES IN PRECAST UNITS TO BE FILLED WITH CONCRETE REPAIR MATERIAL IN ACCORDANCE WITH NYSDOT 701-04 SPECIFICATION.

PERMIT NOTE

CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FROM CITY AND STATE AGENCIES FOR UTILITIES AND ROAD PAVEMENT INCLUDING RIGH-OF-WAY WORK.

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

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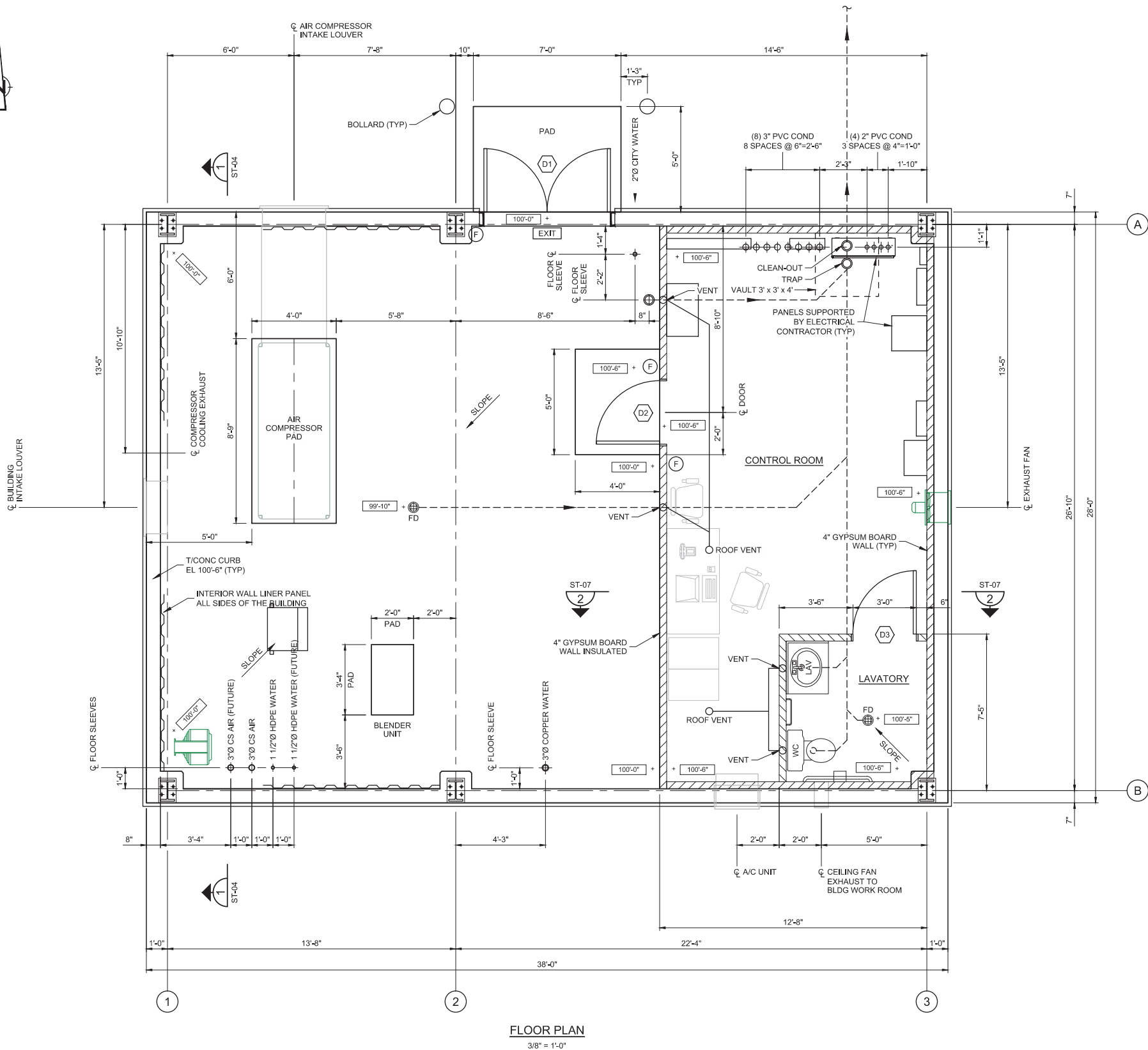
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
GENERAL NOTES



**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:			Date: AUGUST 2012
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: ST-01



**BUILDING CODE DATA**

CODE:	BUILDING CODE OF NEW YORK STATE
LOCATION:	TOWN OF OYSTER BAY, NASSAU COUNTY, NEW YORK
BUILDING DIMENSIONS:	28'-0" x 38'-0" ONE STORY
BUILDING HEIGHT:	14'-6" NOMINAL EAVE - ABOVE FLOOR
BUILDING AREA:	1,064 SQUARE FEET (TABLE 503)
OCCUPANCY CLASS:	USE GROUP F-2 FACTORY INDUSTRIAL (SECTION 306.3)
CONSTRUCTION:	NON-COMBUSTIBLE TYPE 2B (SECTION 602.2, TABLE 601)
OCCUPANT LOAD:	ACTUAL - NONE; TABLE - 10 PERSONS (SECTION 1003.2.2.2)
BUILDING TYPE:	PRE-ENGINEERED METAL, STRUCTURAL STEEL RIGID FRAMED
BUILDING INSULATION:	WALLS - R19, ROOF - R30
FIRE SEPARATION DISTANCE:	GREATER THAN 30 FEET
FIRE RESISTANCE RATING:	EXTERIOR WALL - 0 HR (TABLES 601 & 602)
FIRE SEPARATION ASSEMBLIES:	NOT REQUIRED (TABLE 302.3.3)

**STRUCTURAL LOADS (NON-FACTORED)**

1. DEAD LOAD	STRUCTURAL, NONSTRUCTURAL, EQUIPMENT, PIPE, CABLE
2. FLOOR LIVE LOAD	
UNIFORMLY DISTRIBUTED LOAD	125 POUNDS PER SQUARE FOOT
CONCENTRATED LOAD	2,000 POUNDS (ON 2 1/2 FT x 2 1/2 FT SQUARE AREA)
3. ROOF LIVE LOAD	
0 - 200 SQUARE FEET TRIBUTARY AREA	20 POUNDS PER SQUARE FOOT
201 - 600 SQUARE FEET TRIBUTARY AREA	16 POUNDS PER SQUARE FOOT
OVER 600 SQUARE FEET TRIBUTARY AREA	12 POUNDS PER SQUARE FOOT
CONCENTRATED LOAD	200 POUNDS (ON AREA OF ONE SQUARE INCH)
4. ROOF SNOW LOAD	
GROUND SNOW LOAD	45 POUNDS PER SQUARE FOOT (FIGURE 1608.2)
SNOW EXPOSURE FACTOR	0.9 (TABLE 1608.3.1)
SNOW LOAD IMPORTANCE FACTOR	1.0 (SECTION 1604.5)
5. WIND LOAD	
BASIC WIND SPEED (3-SECOND GUST)	120 MILES PER HOUR (FIGURE 1609)
EXPOSURE CATEGORY	C (SECTION 1609.4)
WIND LOAD IMPORTANCE FACTOR	1.0 (SECTION 1604.5)
6. EARTHQUAKE LOAD	
SEISMIC USE GROUP	GROUP I (SECTION 1616.2)
SEISMIC IMPORTANCE FACTOR	1.0 (SECTION 1604.5)
SITE CLASS	D (SECTION 1615.1.1)
7. SPECIAL LOADS	
COLLATERAL IMPOSED CEILING LOAD	10 POUNDS PER SQUARE FOOT
PIPE/CABLE & EQUIPMENT LOADS	REFER DRAWINGS
FLOOD LOAD	NONE
UNIT HEATER	250 POUNDS EACH
AIR CONDITIONER	500 POUNDS
8. DEFLECTION LIMITATION	
EXTERIOR WALL AND ROOF SYSTEMS	NOT TO EXCEED 1/240 OF SPAN OF STRUCTURAL MEMBER
9. FOUNDATION	
NET ALLOWABLE SOIL BEARING PRESSURE	3,000 POUNDS PER SQUARE FOOT
MODULUS OF SUBGRADE REACTION	200 KIPS PER CUBIC FOOT

**LEGEND**

+ 100'-0"	ELEVATION FEET AMSL
EXIT	EXIT SIGN INSTALLED ABOVE DOOR
F	FIRE EXTINGUISHER
D1	DOOR
→	DIRECTION OF FLOOR SLOPE
UNIT HEATER	UNIT HEATER
WALL INTERIOR PANEL	WALL INTERIOR PANEL
GYPSUM BOARD WALL (FIRE-RATED)	GYPSUM BOARD WALL (FIRE-RATED)
FD	FLOOR DRAIN

**AS BUILT  
RECORD DRAWING**

**NOTES**

- ELECTRICAL CONTRACTOR SHALL INSTALL CONDUITS IN CONTROL ROOM FLOOR SLAB AREA PRIOR TO SLAB CONSTRUCTION.
- CONTRACTOR SHALL INSTALL FLOOR SLEEVES FOR PIPING PRIOR TO SLAB CONSTRUCTION.
- REFER MECHANICAL DRAWINGS FOR PLUMBING.
- FLOOR DRAIN SHALL BE FD-2330-PV3 HEAVY DUTY WITH SEDIMENT BASKET BY ZURN (TEL. (716) 665-1131, WWW.ZURN.COM).

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BIOSPARGE TREATMENT SYSTEM

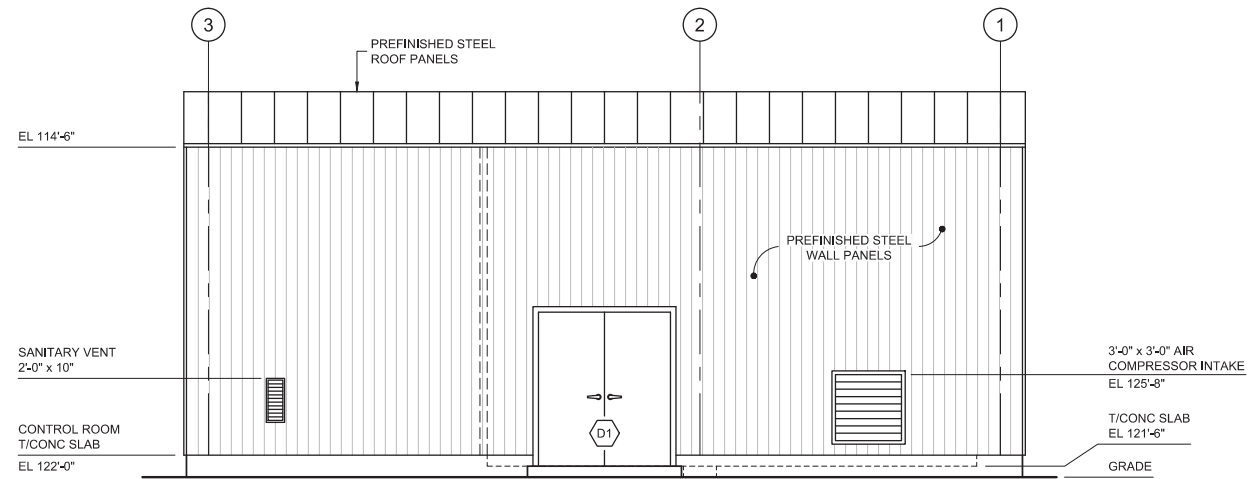
CONTROL BUILDING  
FLOOR PLAN



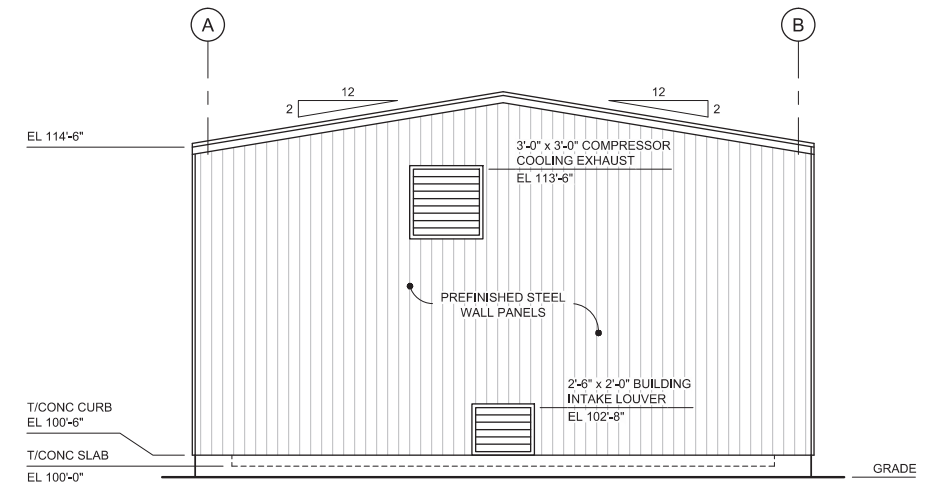
**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:	Date:
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Designed By: SKM	Drawn By: ZM
Scale: 3/8"=1'-0"	Project No: 06883-00
Report No: 056	Drawing No: ST-02

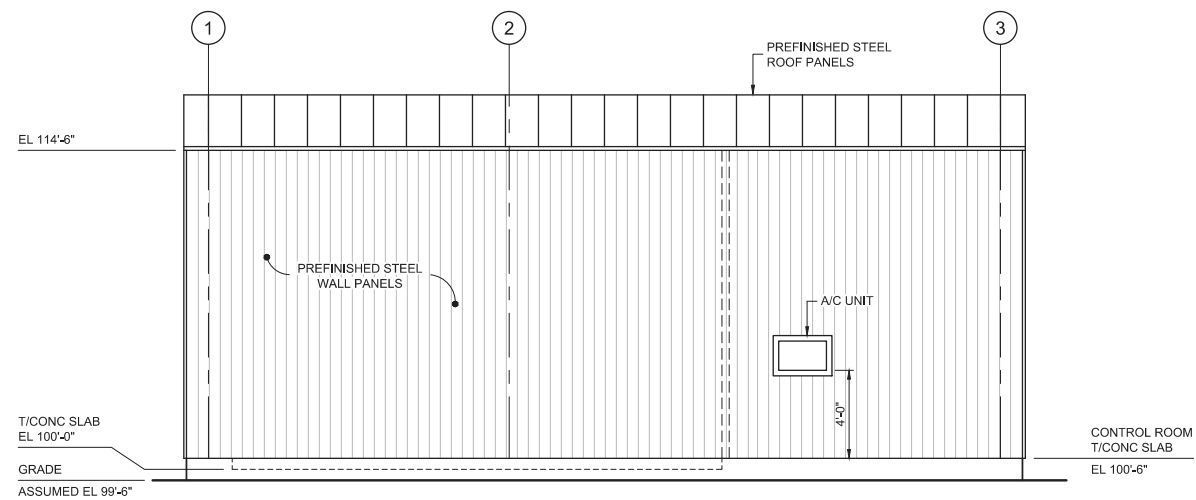




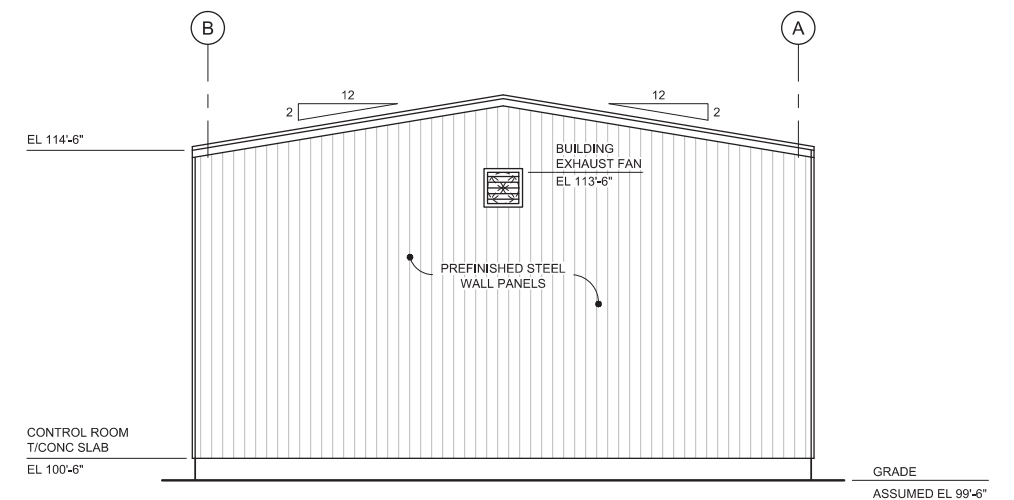
**NORTH ELEVATION**



**WEST ELEVATION**



**SOUTH ELEVATION**



**EAST ELEVATION**

CONTRACTOR SHALL PROVIDE BUILDING EXTERIOR ELEVATION OF 114'-6" AND INTERIOR CLEARANCE AT PRIMARY RIGID FRAME OF MINIMUM 12'-8" ABOVE FLOOR SLAB EL 100'-0", WHICHEVER RESULTS IN GREATER BUILDING HEIGHT

**AS BUILT  
RECORD DRAWING**

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.			
1	AS BUILT	08/29/12	ZM
No	Revision	Date	Initial

Approved

WARNING: ALTERING THIS DOCUMENT IS IN VIOLATION OF THE NEW YORK STATE EDUCATION LAW EXCEPTING AS PROVIDED IN SECTION 7209, PART 2 OF THE LAW.

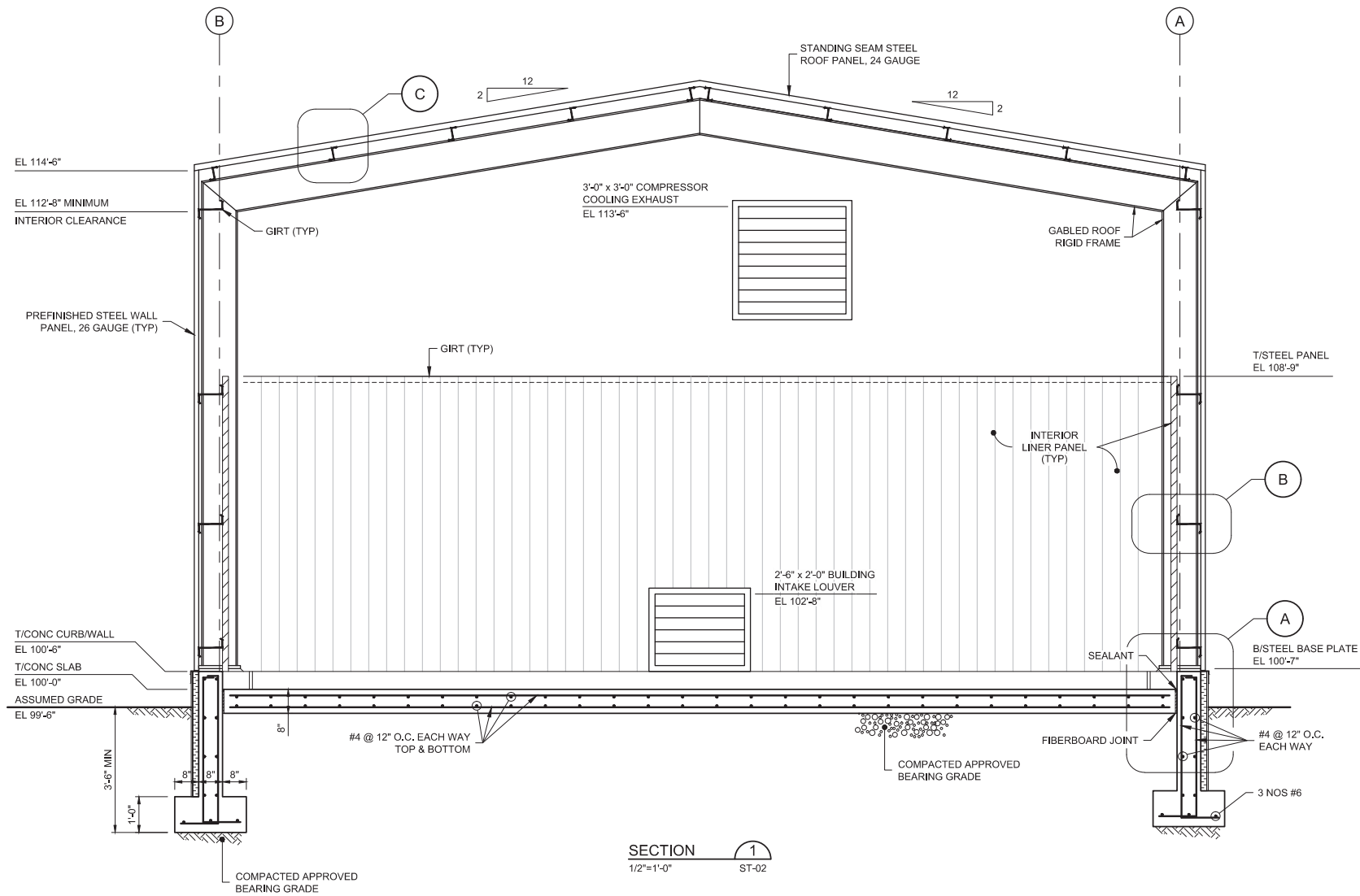
HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

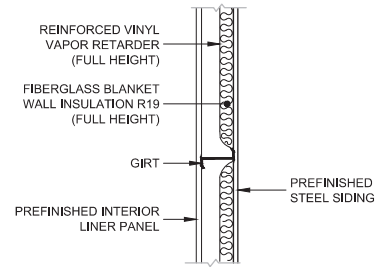
CONTROL BUILDING  
ELEVATIONS

		<b>CRA Infrastructure &amp; Engineering, Inc.</b>	
Source Reference:			Date: AUGUST 2012
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: 1/4"=1'-0"	Project No: 06883-00	Report No: 056	Drawing No: ST-03

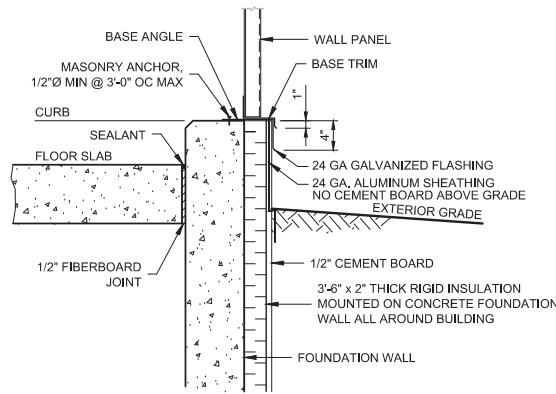




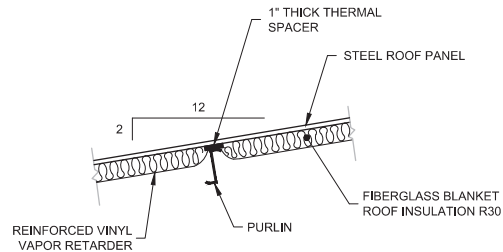
CONTRACTOR SHALL PROVIDE BUILDING EXTERIOR ELEVATION OF 114'-6" AND INTERIOR CLEARANCE AT PRIMARY RIGID FRAME OF MINIMUM 12'-8" ABOVE FLOOR SLAB EL 100'-0", WHICHEVER RESULTS IN GREATER BUILDING HEIGHT



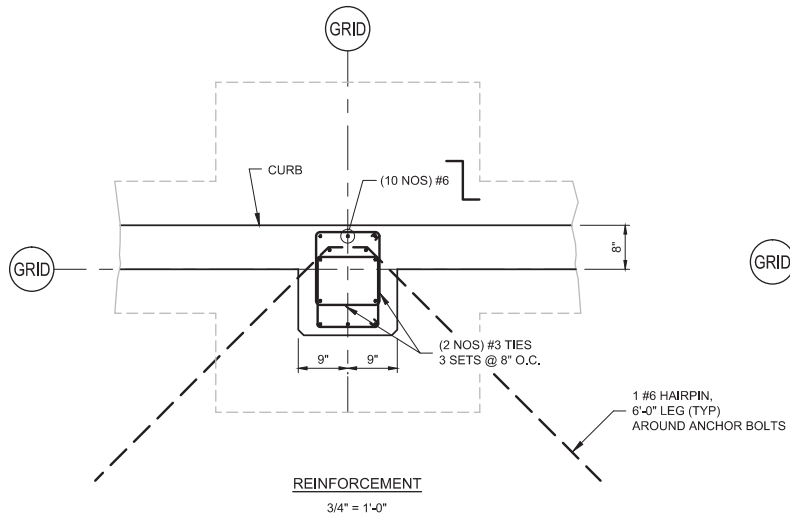
WALL INSULATION  
NTS



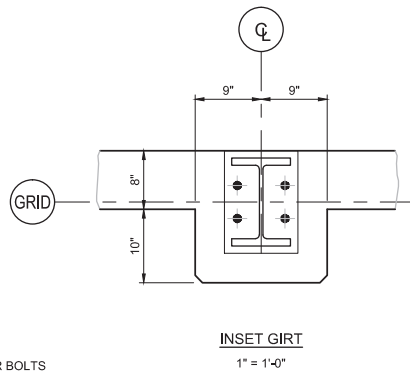
WALL BASE  
NTS



ROOF INSULATION  
NTS



BUILDING COLUMN PIERS - TYPICAL



AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	ZM

Approved

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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

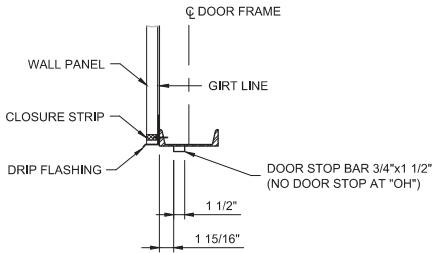
CONTROL BUILDING  
SECTION AND DETAILS



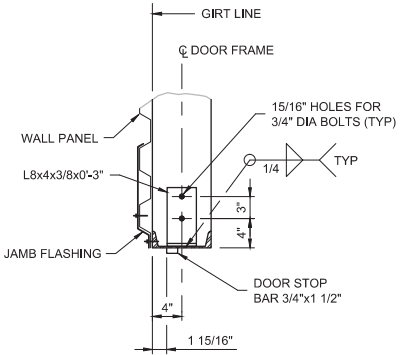
**CRA Infrastructure & Engineering, Inc.**

Source Reference:	Date:
Project Manager: JK	Reviewed By: JGRW
Designed By: SKM	Drawn By: ZM
Scale: AS NOTED	Project No: 06883-00
Report No: 056	Drawing No: ST-04

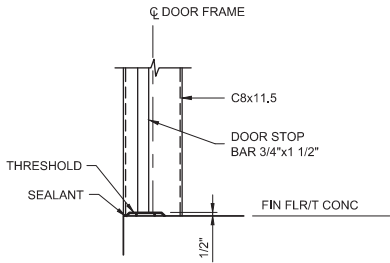
06883-00(056)ST-BU004 AUG 22/2012



HEAD H-1  
1"=1'-0"

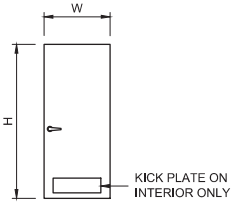


JAMB J-1  
1"=1'-0"

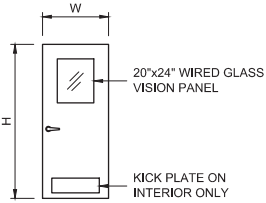


SILL S-1  
1"=1'-0"

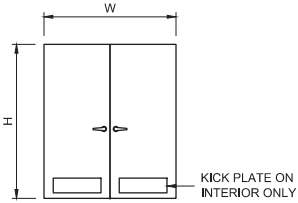
DOOR & HARDWARE SCHEDULE																							
ABBREVIATIONS:												INTERIOR LEFT HAND      RIGHT HAND EXTERIOR      INTERIOR LEFT HAND REVERSE BEVEL      RIGHT HAND REVERSE BEVEL EXTERIOR											
DOOR												FRAME				HARDWARE							
DOOR MARK	TYPE	DOOR HAND	FIRE RATING LABELED	EXTERIOR	INTERIOR	THERMAL INSUL.	DOOR OPENING		THICKNESS	MATERIAL	GLAZING	MATERIAL	HEAD DETAIL	JAMB DETAIL	SILL DETAIL	CLOSER	DOOR STOP	HINGES	KICK PLATE	PANIC SET	THRESHOLD	WEATHERSTRIP	REMARKS
							WIDTH "W"	HEIGHT "H"															
D1	"C"	RHRB LHRB	-	X		R14.97	6'-0"	7'-0"	1 3/4"	GHM	-	STL	H-1	J-1	S-1	X	X	6	X	X	A	X	LHRB DOOR - DEAD BOLT T & B, RHRB DOOR - LATCHES & EXIT DEVICE
D2	"B"	RHRB	3/4 HR		X	R2.44	3'-0"	7'-0"	1 3/4"	GHM	SFT	STL	-	-	-	X	X	3	X	X	B	X	
D3	"A"	RHRB	-		X	-	3'-0"	7'-0"	1 3/4"	GHM	-	STL	-	-	-	X	-	3	X	-	-	-	INTERIOR LATCH



"A"



"B"



"C"

DOOR TYPES  
1/4" = 1'-0"

DOOR AND HARDWARE NOTE

ALL DOORS AND HARDWARE SHALL BE AS SPECIFIED OR APPROVED EQUAL, AND SHALL CONFORM TO CODE REQUIREMENTS FOR ACCESSIBILITY.

DOORS

- EXTERIOR DOORS SHALL BE "IMPERIAL" BY CECO DOOR PRODUCTS, 16 GAUGE, POLYURETHANE CORE, GALVANIZED AND PAINTED.
- INTERIOR DOORS SHALL BE "REGENT" BY CECO DOOR PRODUCTS, 18 GAUGE, HONEYCOMB CORE, GALVANIZED AND PAINTED.

HARDWARE (MANUFACTURER'S STANDARD)

- CLOSER: 1250 SERIES ALUMINUM ENAMEL (EN) - "SARGENT".
- DOOR STOP: TRI BASE FLOOR STOP #259F-US26D - "HAGER".
- HINGES: FULL MORTISE STAINLESS STEEL 32D, 4 1/2"x4 1/2"x0.134 GAUGE, #BB1191 - "HAGER".
- KICK PLATE: STAINLESS STEEL 32D, 16 GAUGE, 8"x26", #220S - "HAGER".
- PANIC SET:
  - EXIT DEVICE: #12-9913-ETF, US 32D FIRE RATED - "SARGENT"; EXTERIOR DOOR BY BUTLER.
  - PUSH PLATE: STAINLESS STEEL 32D, 3"x12", #30S - "HAGER".
  - PULL PLATE: STAINLESS STEEL 32D, 3"x12", #32G - "HAGER".
  - LOCKS: MORTISE - "SARGENT".
- THRESHOLD:
  - SKID RESISTANT ABRASIVE CAST ALUMINUM HEAVY DUTY, 4" WIDE, #624S - "HAGER".
  - NON-SLIP ABRASIVE ALUMINUM SADDLE, 4" WIDE, #410S - "HAGER".
- WEATHERSTRIP AND DOOR BOTTOM:
  - WEATHERSTRIP JAMB & HEAD #870S-N - "HAGER".
  - DOOR BOTTOM #774S-V - "HAGER".

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	ZM
No	Revision	Date	Initial

Approved

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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

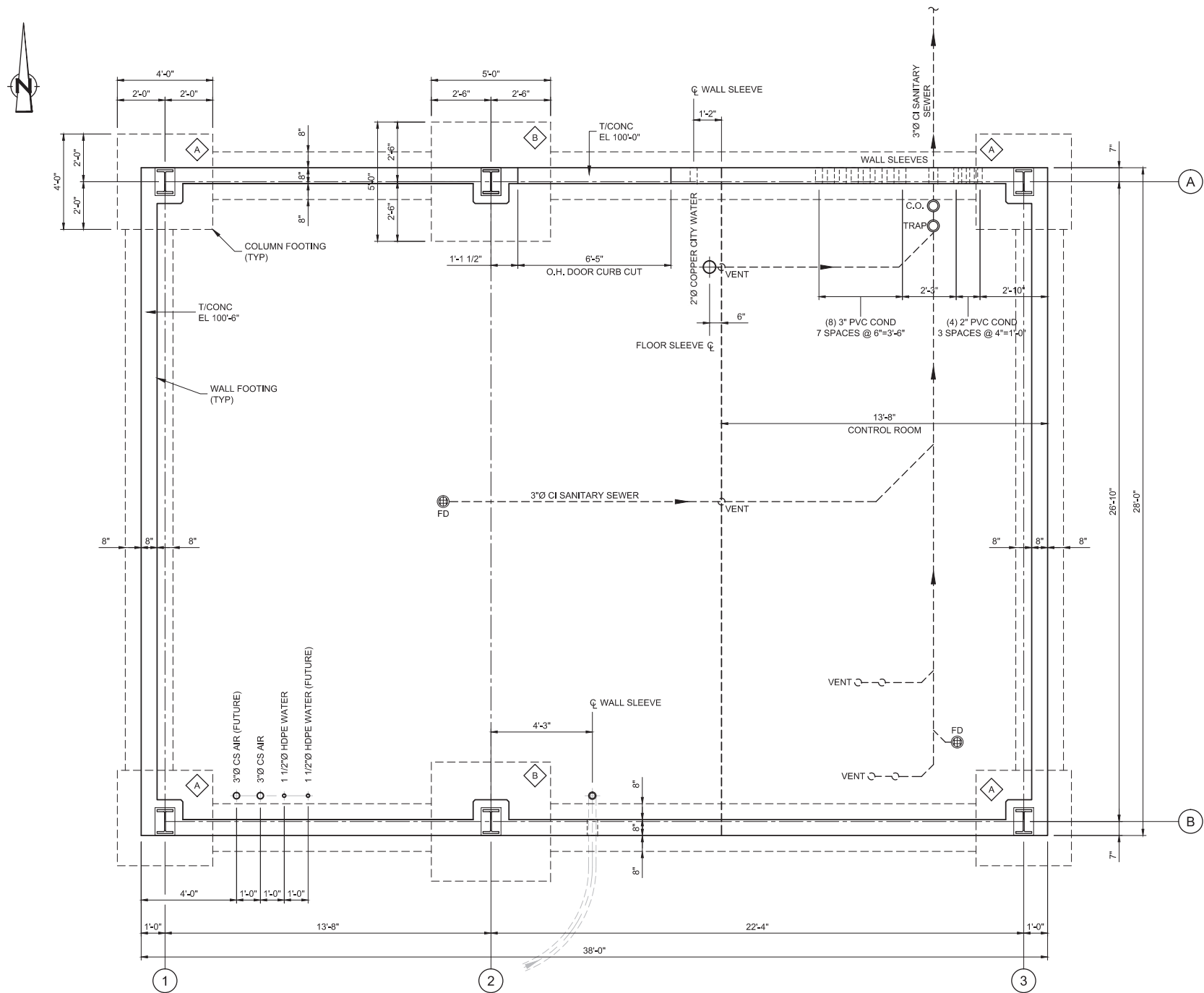
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
SCHEDULE & DETAILS



**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:			Date: AUGUST 2012
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: AS NOTED	Project No: 06883-00	Report No: 056	Drawing No: ST-05

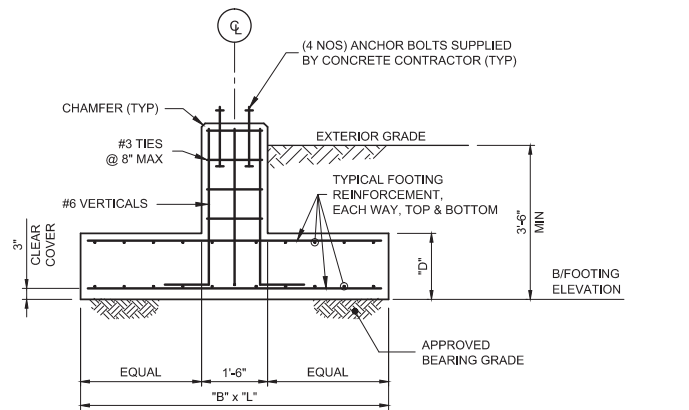


FOUNDATION PLAN  
3/8" = 1'-0"

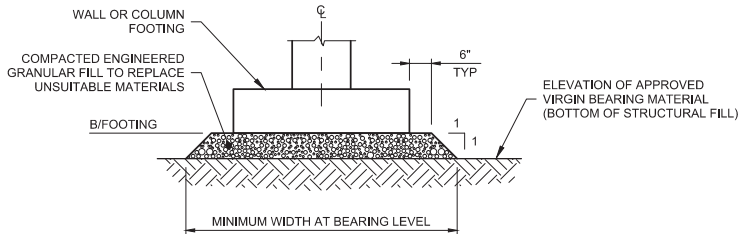
NOTES

1. FOOTING SIZES AND DETAILS SHOWN ON VARIOUS DRAWINGS ARE BASED ON BUTLER MANUFACTURING COMPANY INFORMATION PROVIDED TO CRAIE.
2. FOOTING SIZES, DETAILS AND DESIGN SHALL BE VERIFIED/MODIFIED BASED ON ACTUAL PRE-ENGINEERED BUILDING LOADS PROVIDED BY MANUFACTURER PRIOR TO ORDERING MATERIALS FOR CONSTRUCTION.
3. FOR ANCHOR BOLT AND BUILDING COLUMN LAYOUT DETAILS REFER TO DRAWINGS BY PRE-ENGINEERED BUILDING MANUFACTURER.
4. BUILDING COLUMN FOUNDATION ANCHORS LAYOUT, NUMBER, TYPE, DIAMETER, LENGTH, EMBEDMENT DEPTH, AND OTHER DETAILS SHALL BE BASED ON BUILDING MANUFACTURER'S REQUIREMENTS AND LOADINGS. THE ANCHORS SHALL BE INSTALLED PER ITS MANUFACTURER'S RECOMMENDATIONS.
5. CONTINUE WALL HORIZONTAL AND VERTICAL REINFORCEMENTS INTO COLUMN PIERS AND FOUNDATIONS, RESPECTIVELY.
6. PROVIDE TYPICAL PIER REINFORCEMENTS FOR ALL BUILDING COLUMNS.

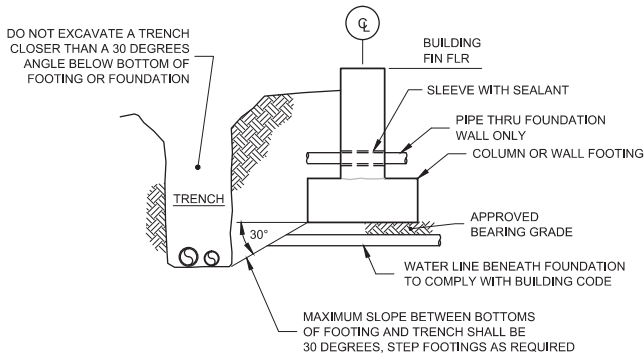
COLUMN FOOTING SCHEDULE								
FOOTING MARK	DIMENSIONS			REINFORCEMENT				NOTES
	"B" (EAST-WEST)	"L" (NORTH-SOUTH)	"D"	BOTTOM (EAST-WEST)	BOTTOM (NORTH-SOUTH)	TOP (EAST-WEST)	TOP (NORTH-SOUTH)	
A	4'-0"	4'-0"	1'-6"	7 #7	7 #7	5 #3	5 #3	-
B	5'-0"	5'-0"	1'-6"	7 #7	7 #7	5 #3	5 #3	-



COLUMN FOOTING DETAIL  
NTS



FILL BENEATH FOUNDATION  
NTS



TRENCH NEAR FOOTING  
NTS

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	ZM

Approved

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HOOKE/RUCO SITE  
HICKSVILLE, NEW YORK

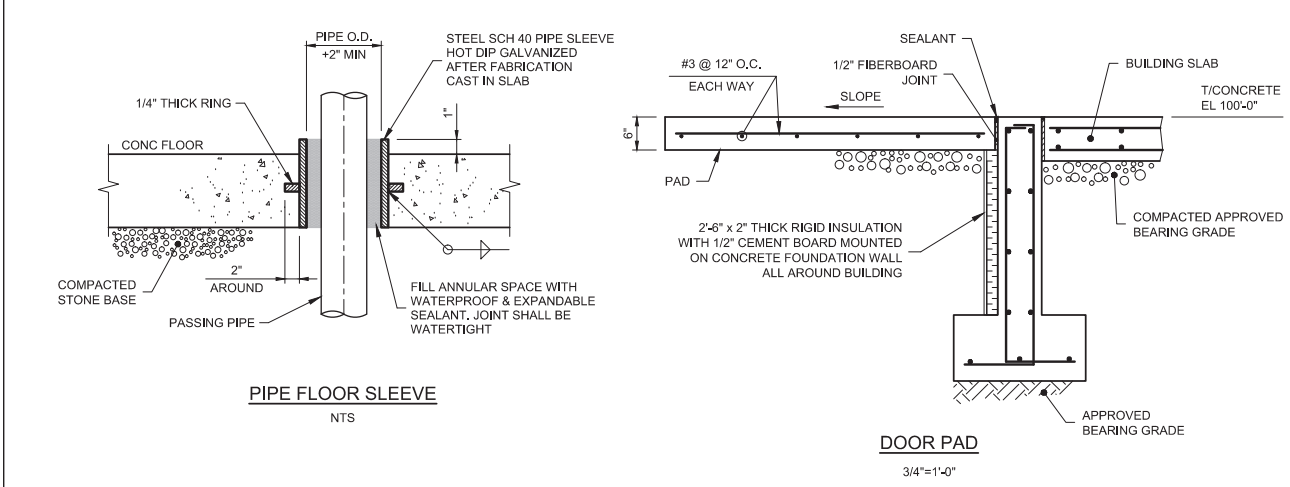
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
FOUNDATION PLAN

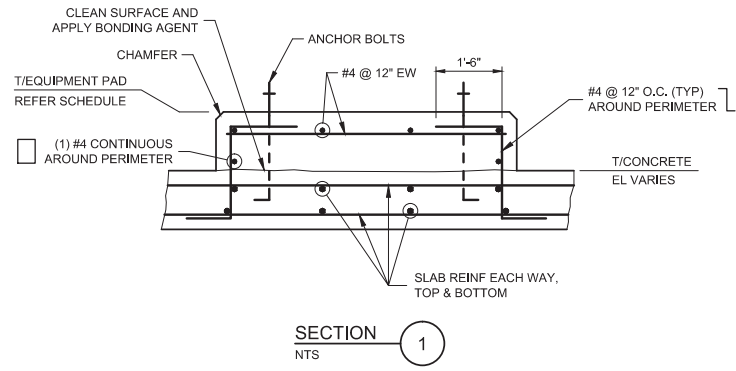
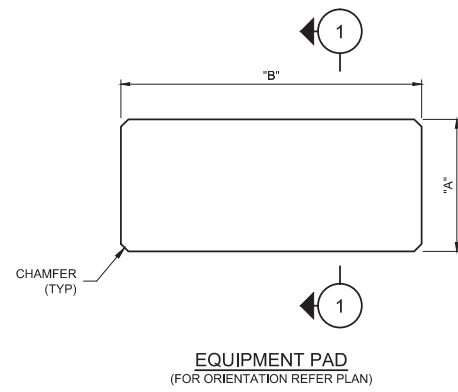


CRA Infrastructure  
& Engineering, Inc.

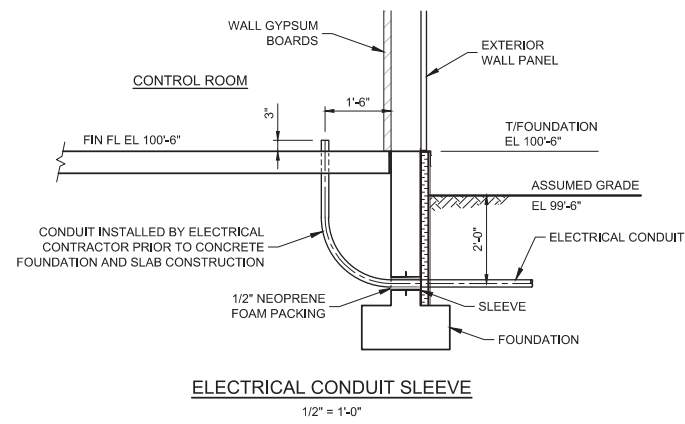
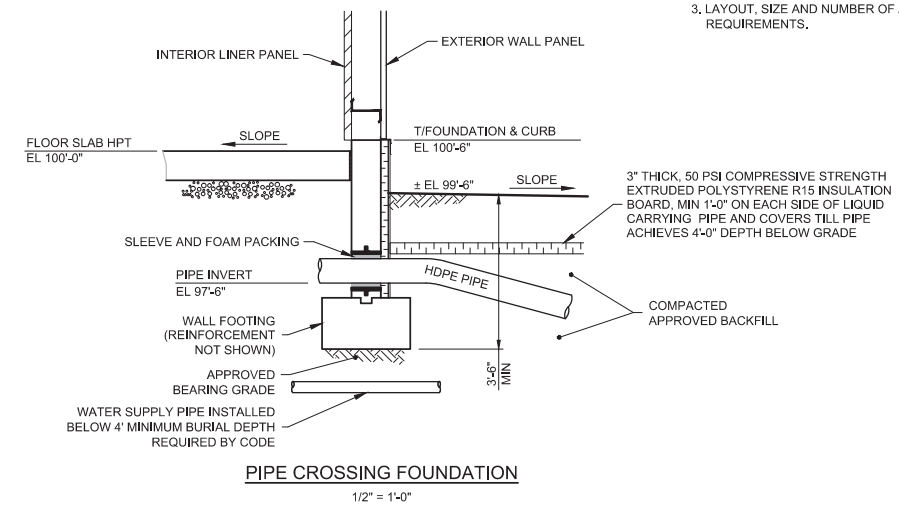
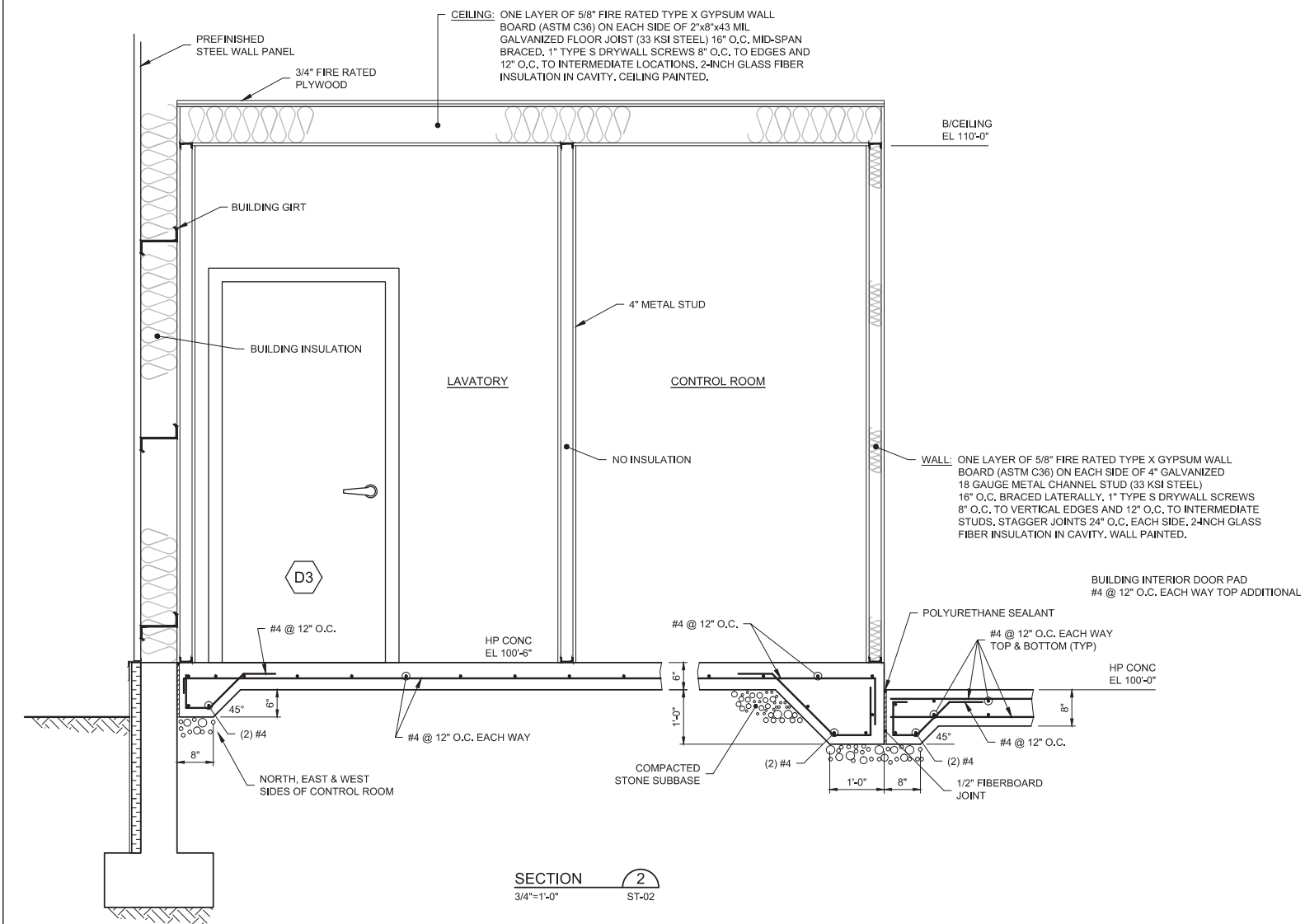
Source Reference:			Date:
Project Manager:			AUGUST 2012
JK	Reviewed By:	Designed By:	Drawn By:
	JGRW	SKM	ZM
Scale:	Project No:	Report No:	Drawing No:
3/8" = 1'-0"	06883-00	056	ST-06



EQUIPMENT PAD SCHEDULE													
EQUIP No	DESCRIPTION	TYPE	A	B	C	D	E	F	G	H	T/PAD EL	ANCHOR BOLTS	REMARKS
-	AIR COMPRESSOR	-	4'-0"	8'-9"	-	-	-	-	-	-	100'-8"	HILTI	-
-	SUPPLEMENT BLENDING UNIT	-	2'-0"	3'-4"	-	-	-	-	-	-	100'-8"	HILTI	-



- NOTES
1. HILTI ANCHOR BOLTS SHALL CONSIST OF HVA ANCHORING SYSTEM (HVA ADHESIVE AND HAS STAINLESS STEEL ROD) WITH SPECIFIED BOLT DIAMETER AND MINIMUM CONCRETE EMBEDMENT.
  2. HILTI ANCHORS SHALL BE SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR.
  3. LAYOUT, SIZE AND NUMBER OF ANCHORS SHALL BE AS PER MECHANICAL REQUIREMENTS.



AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	ZM
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Approved

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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
MISCELLANEOUS DETAILS

**CRA Infrastructure & Engineering, Inc.**

Source Reference:		Date: AUGUST 2012	
Project Manager: JK	Reviewed By: JGRW	Designed By: SKM	Drawn By: ZM
Scale: AS NOTED	Project No: 06883-00	Report No: 056	Drawing No: ST-07





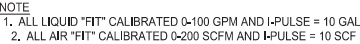














 <b>CRA Infrastructure &amp; Engineering, Inc.</b>			
Source Reference:			
Date: SEPTEMBER 2003			
Project Manager: J. KAY	Reviewed By:	Designed By: B.A. BEEBE	Drawn By: B.A. BEEBE
Scale:	Project No: 06883-00	Report No: 056	Drawing No: EF-04

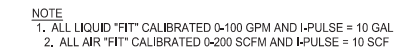


1. ALL LIQUID "FIT" CALIBRATED 0-100 GPM AND I-PULSE = 10 GAL
2. ALL AIR "FIT" CALIBRATED 0-200 SCFM AND I-PULSE = 10 SCF


[illegible]

<div style="text-align: center;"> <p>HOOKER/RUCO SITE HICKSVILLE, NEW YORK</p> <p>BIOSPARGE TREATMENT SYSTEM</p> <p>ENGINEERING FLOW SHEET MIDDLE FENCE INJECTION WELLS</p> </div>		 <p><b>CRA Infrastructure &amp; Engineering, Inc.</b></p>	
		<p>AS BUILT RECORD DRAWING</p>	

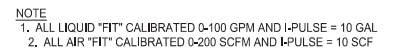
Source Reference:			Date: SEPTEMBER 2003
Project Manager: J. KAY	Reviewed By:	Designed By: B.A. BEEBE	Drawn By: B.A. BEEBE
Scale:	Project No: 06883-00	Report No: 056	Drawing No: EF-05




<div style="border: 2px solid blue; padding: 5px; text-align: center;"> <b>AS BUILT RECORD DRAWING</b> </div>	
HOOKER/RUCO SITE HICKSVILLE, NEW YORK	
BIOSPARGE TREATMENT SYSTEM	
ENGINEERING FLOW SHEET NORTH FENCE INJECTION WELLS	

 <b>CRA Infrastructure &amp; Engineering, Inc.</b>		
Source Reference:		Date: SEPTEMBER 2003
Project Manager: J. KAY	Reviewed By:	Designed By: B.A. BEEBE
		Drawn By: B.A. BEEBE
Scale:	Project No: 06883-00	Report No: 056
		Drawing No: EF-06





<p>HOOKER/RUCO SITE HICKSVILLE, NEW YORK</p>		<p><b>AS BUILT RECORD DRAWING</b></p>	
		 <p><b>CRA Infrastructure &amp; Engineering, Inc.</b></p>	
<p>BIOSPARGE TREATMENT SYSTEM</p>		<p>Source Reference: _____ Date: SEPTEMBER 2003</p>	
<p>ENGINEERING FLOW SHEET NORTH FENCE INJECTION WELLS</p>		<p>Project Manager: J. KAY</p>	<p>Reviewed By: _____</p>
		<p>Scale: _____</p>	<p>Project No: 06883-00</p>
		<p>Designed By: B.A. BEEBE</p>	<p>Drawn By: B.A. BEEBE</p>
		<p>Report No: 056</p>	<p>Drawing No: EF-08</p>

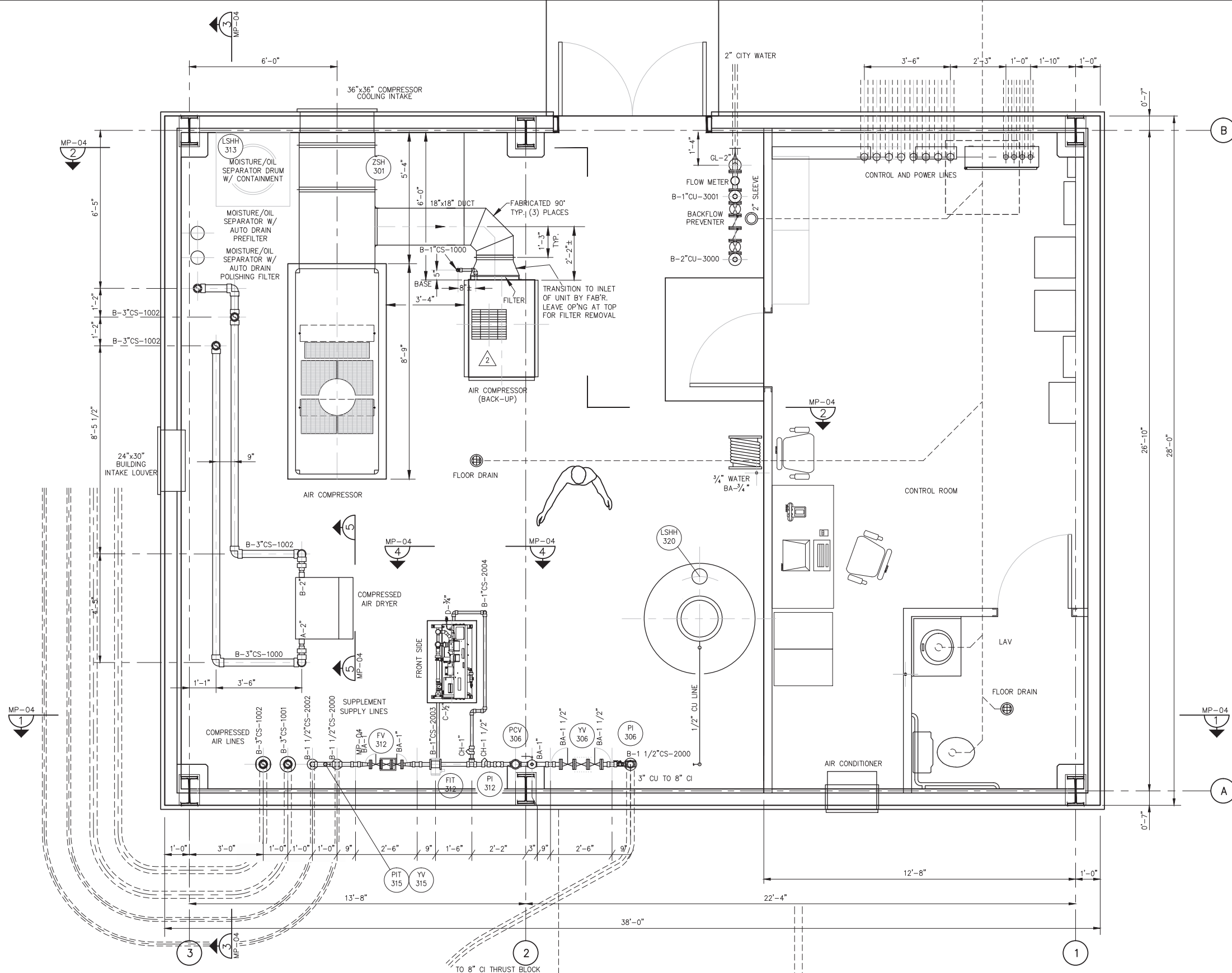




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## CONTROL BUILDING AND WELL FIELD PIPING PLAN





AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

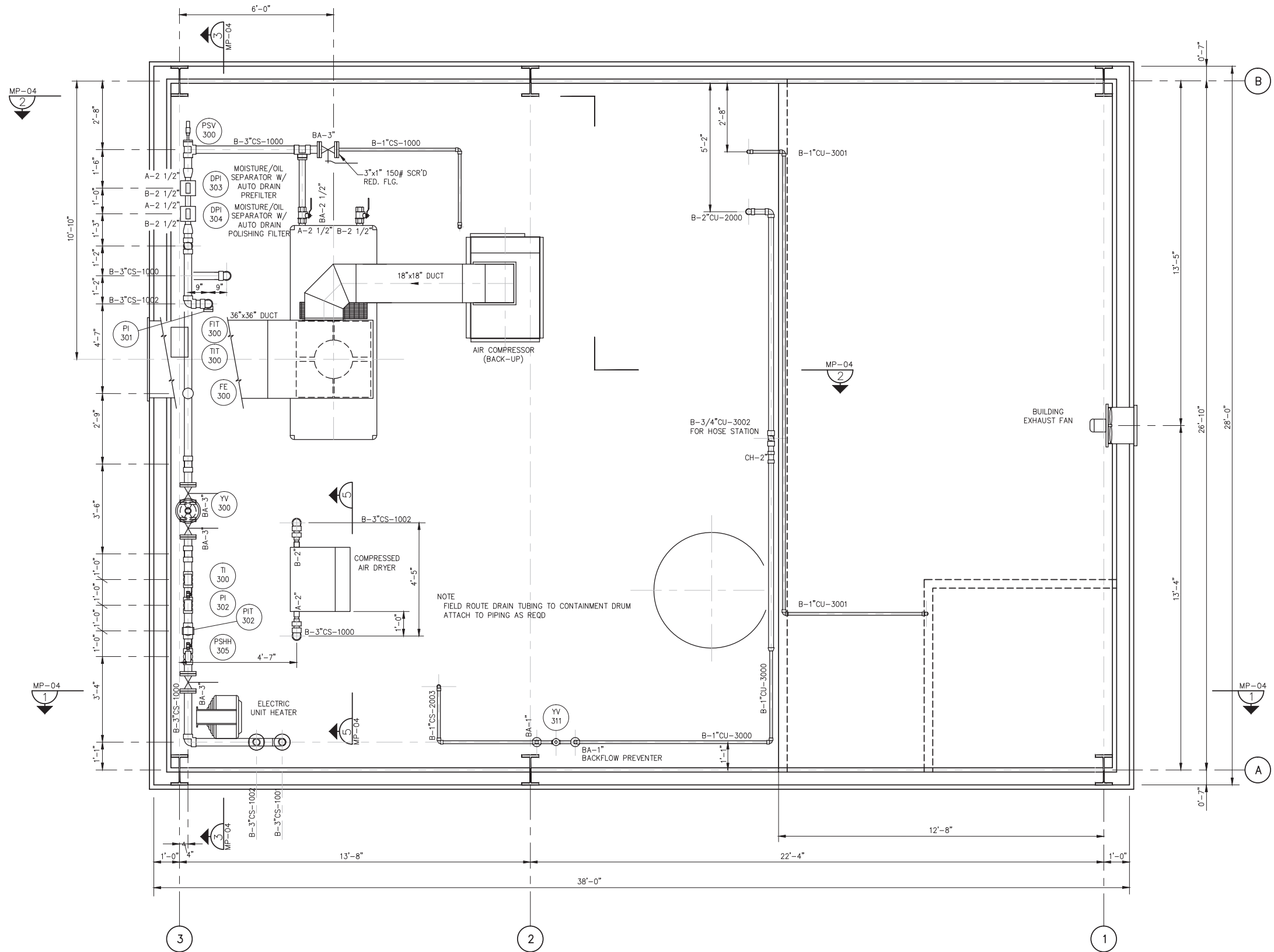
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
EQUIPMENT LAYOUT AT GRADE



Source Reference:			Date:
Project Manager:			7-23-03
J. KAY	Reviewed By:	Designed By:	Drawn By:
	B. A. BEEBE	B. A. BEEBE	B. A. BEEBE
Scale:	Project No:	Report No:	Drawing No:
1/2" = 1'-0"	06883-00	056	MP-02

06883-00(056)MP-BU002 SEP 26/2012



AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

REVISIONS			
No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

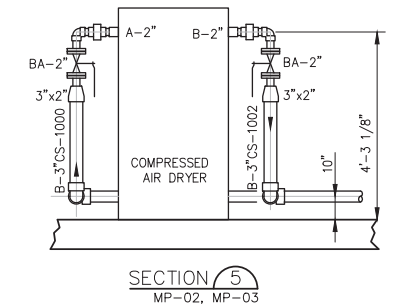
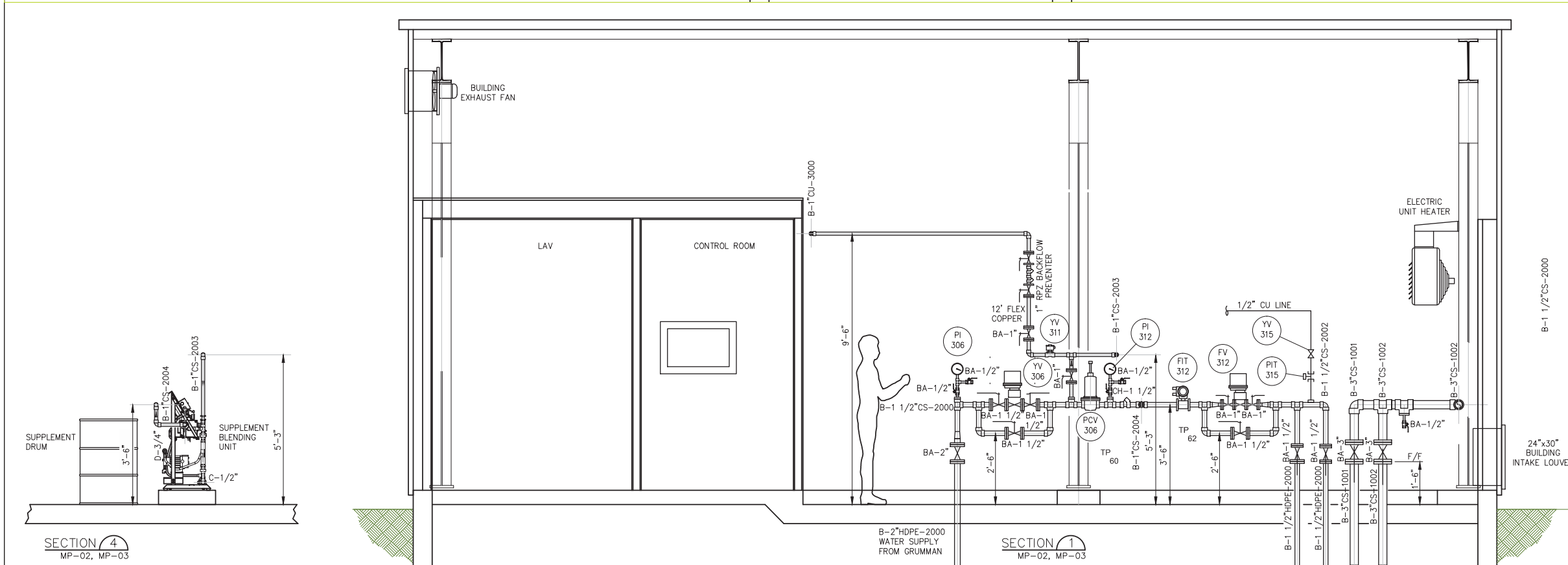
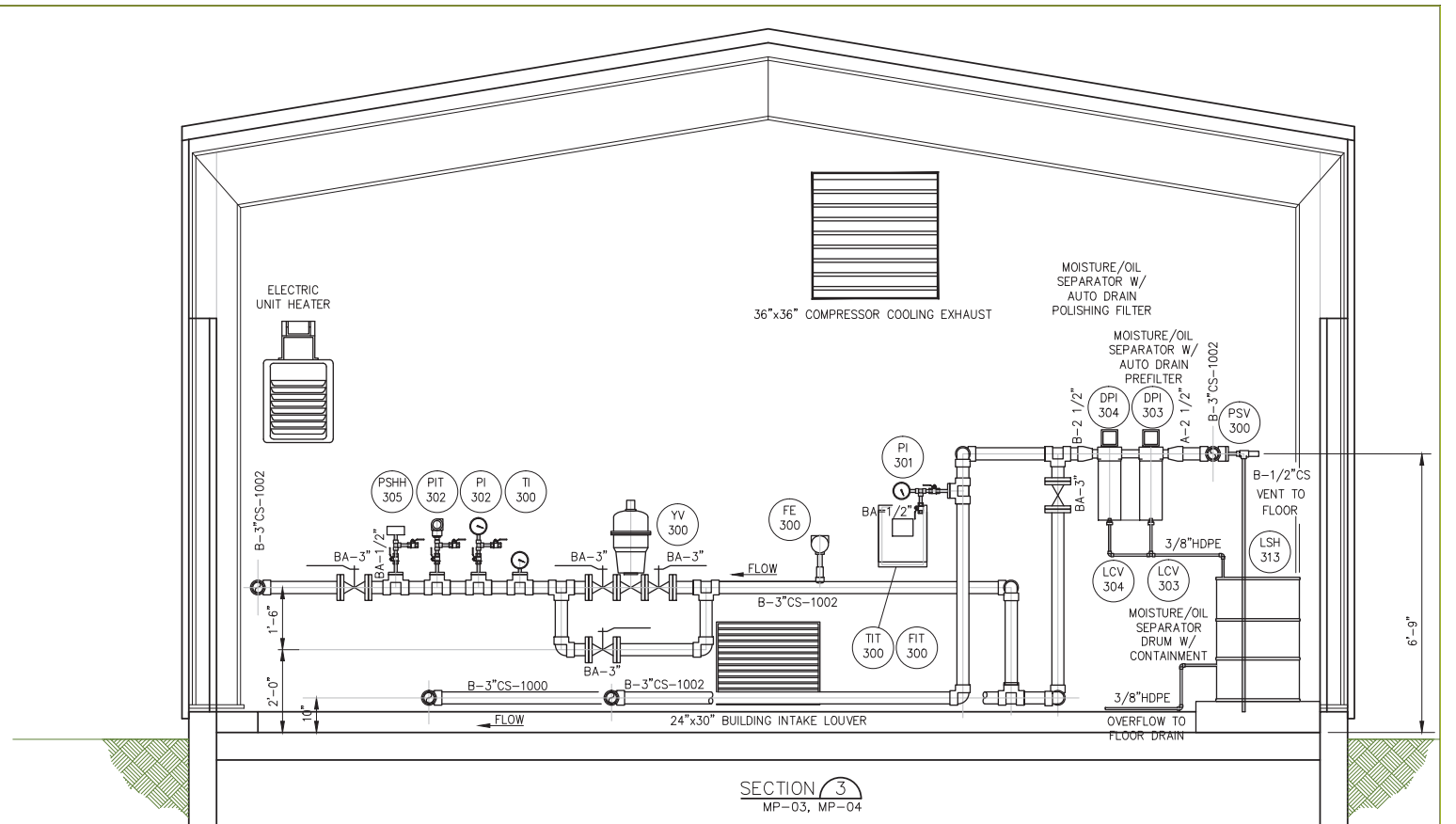
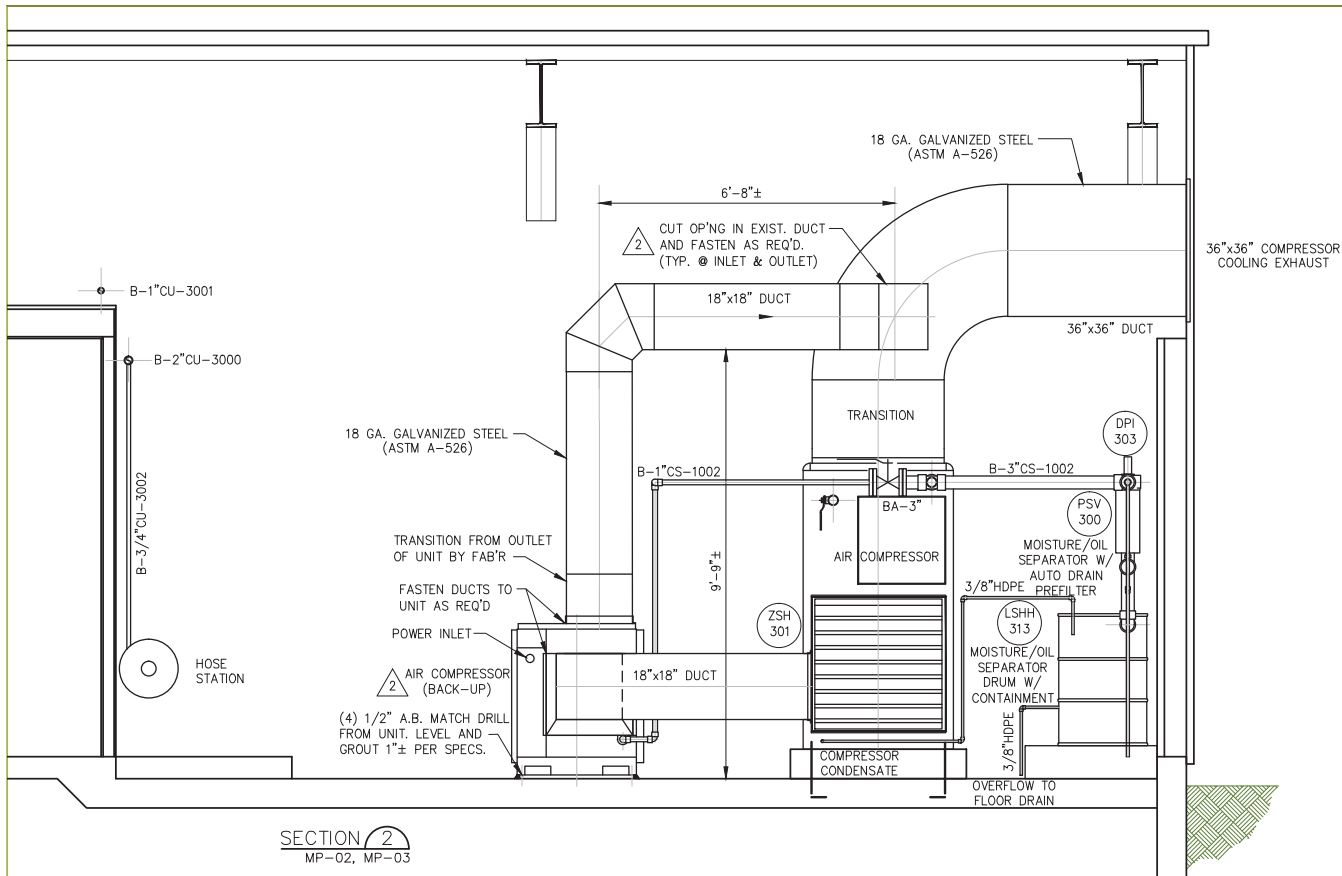
BIOSPARGE TREATMENT SYSTEM

CONTROL BUILDING  
EQUIPMENT LAYOUT (UPPER)



**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:			Date:
Project Manager: J. KAY			7-23-03
Reviewed By:	Designed By:	Drawn By:	
	B. A. BEEBE	B. A. BEEBE	
Scale: 1/2" = 1'-0"	Project No: 06883-00	Report No: 056	Drawing No: MP-03



AS BUILT  
RECORD DRAWING

SECTION 4  
MP-02, MP-03

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

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EDUCATION LAW EXCEPTING AS PROVIDED  
IN SECTION 7209, PART 2 OF THE LAW.

HOOKE/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

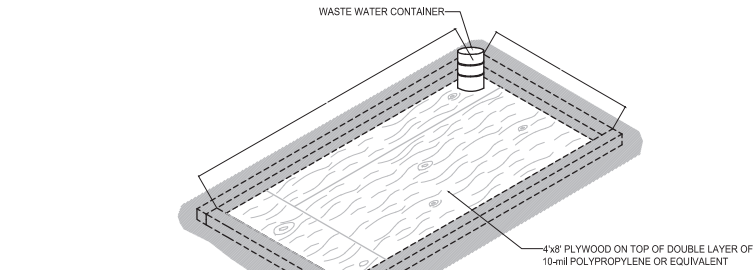
CONTROL BUILDING  
EQUIPMENT SECTIONS

**CRA Infrastructure  
& Engineering, Inc.**

Source Reference:	Date:
Project Manager: J. KAY	Reviewed By: B. A. BEEBE
Scale: 1/2" = 1'-0"	Project No: 06883-00
Report No: 056	Drawing No: MP-04

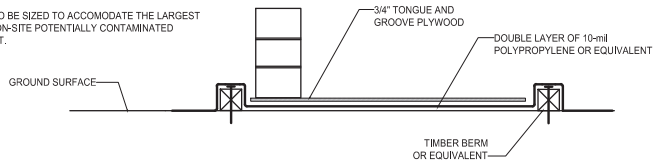
06883-00(056)MP-BU004 SEP 26/2012



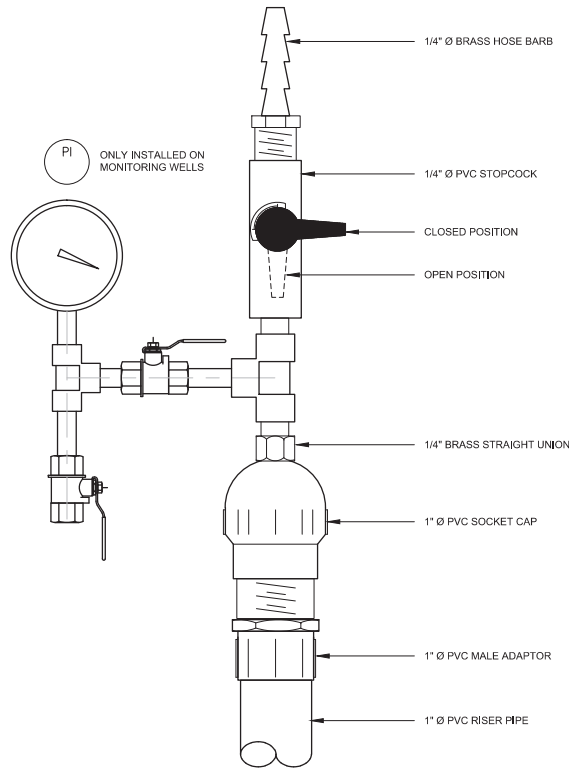


**NOTES:**  
CONSTRUCTION MATERIALS TO BE DETERMINED BASED ON DESIRED DECONTAMINATION AREA USE AND DURATION. THE EXAMPLE SHOWN IS INTENDED FOR A SHORT TERM DURATION, AND A MEDIUM DUTY APPLICATION. (I.E. SAMPLING EQUIPMENT, DRILLING TOOLS, AUGERS)

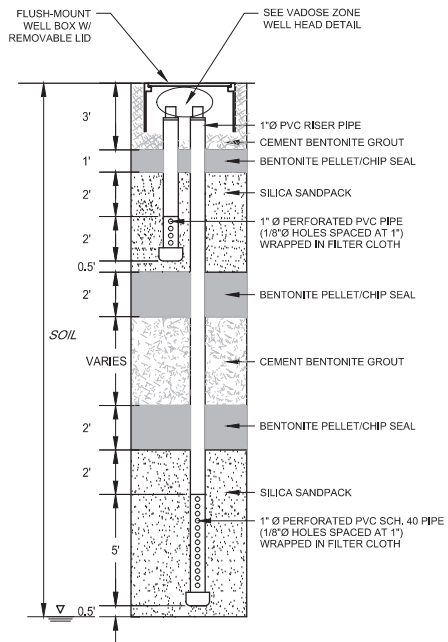
FACILITY TO BE SIZED TO ACCOMMODATE THE LARGEST PIECE OF ON-SITE POTENTIALLY CONTAMINATED EQUIPMENT.



**TYPICAL DECONTAMINATION AREA (MEDIUM DUTY)**

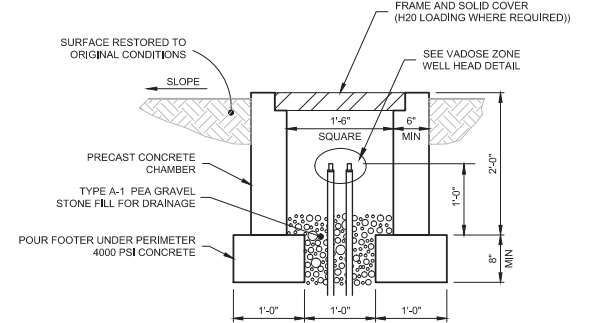


**VADOSE ZONE WELL HEAD DETAIL**



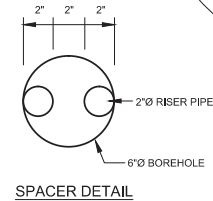
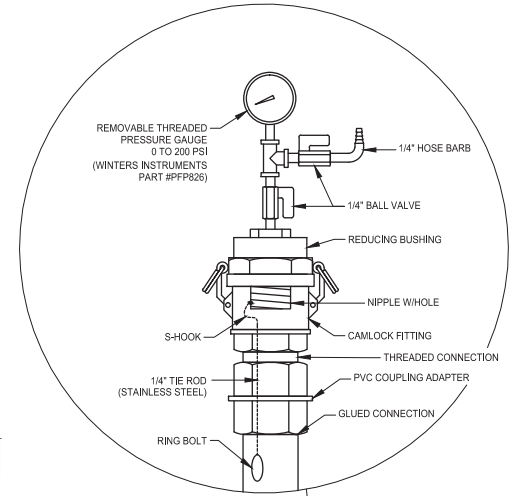
**TYPICAL VADOSE ZONE MONITORING WELL DETAIL**

NOT TO SCALE

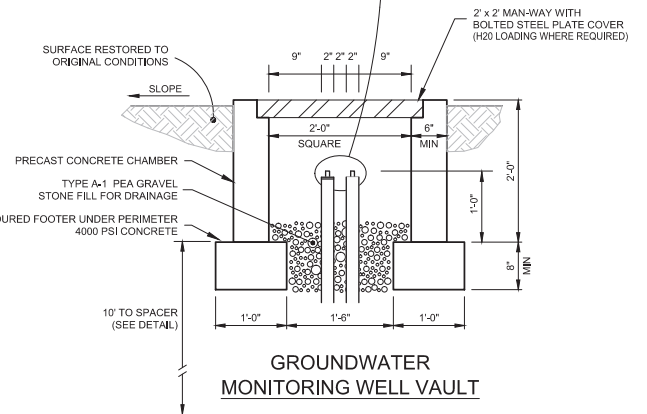


**VADOSE ZONE MONITORING WELL VAULT**

**GROUNDWATER MONITORING WELL HEAD DETAIL**



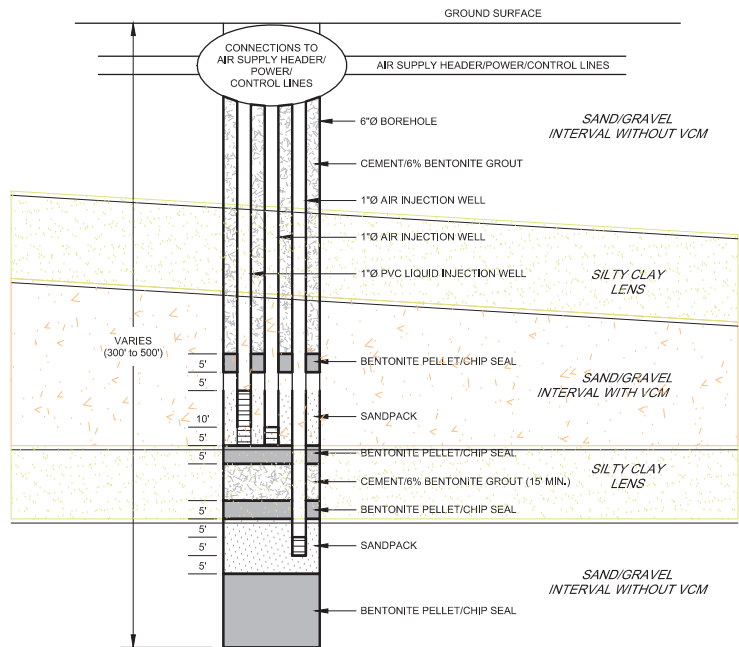
**SPACER DETAIL**



**GROUNDWATER MONITORING WELL VAULT**

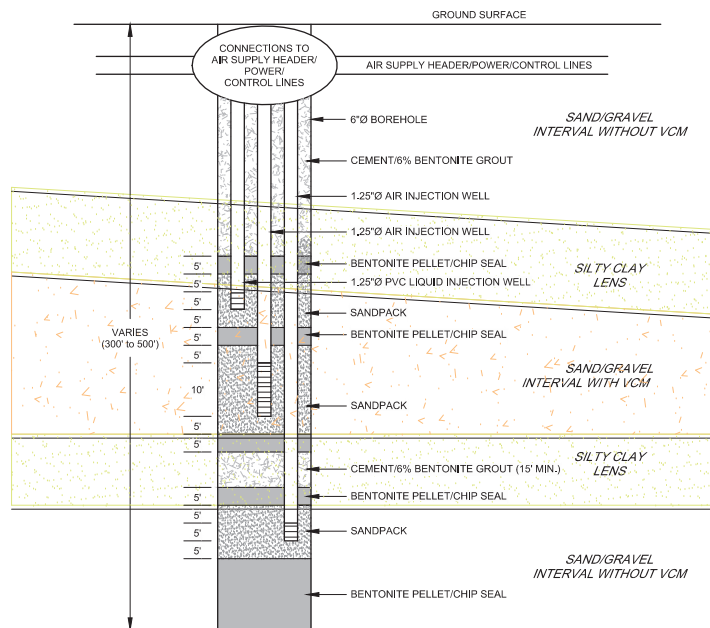
**AS BUILT  
RECORD DRAWING**

**NOTES:**  
1. WELLS EXTEND TO DEPTH RANGING FROM 250' TO 450'  
2. NUMBER OF MONITORED INTERVALS DETERMINED IN THE FIELD



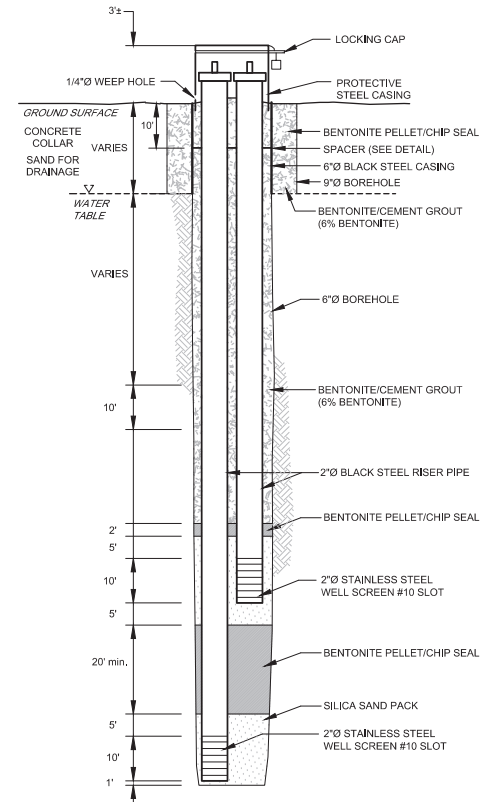
**TYPICAL INJECTION WELL DETAIL  
(IW-16, 17, 18 AND 19)**

NOT TO SCALE



**TYPICAL INJECTION WELL DETAIL  
(IW-1 THRU 7, 15, 20 THRU 22)**

NOT TO SCALE



**TYPICAL GROUNDWATER MONITORING WELL DETAIL**

NOT TO SCALE

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

WARNING: ALTERING THIS DOCUMENT IS IN VIOLATION OF THE NEW YORK STATE EDUCATION LAW EXCEPT AS PROVIDED IN SECTION 7209, PART 2 OF THE LAW.

**HOOKE/RUCO SITE  
HICKSVILLE, NEW YORK**

**BIOSPARGE TREATMENT SYSTEM**

**WELL DETAILS**

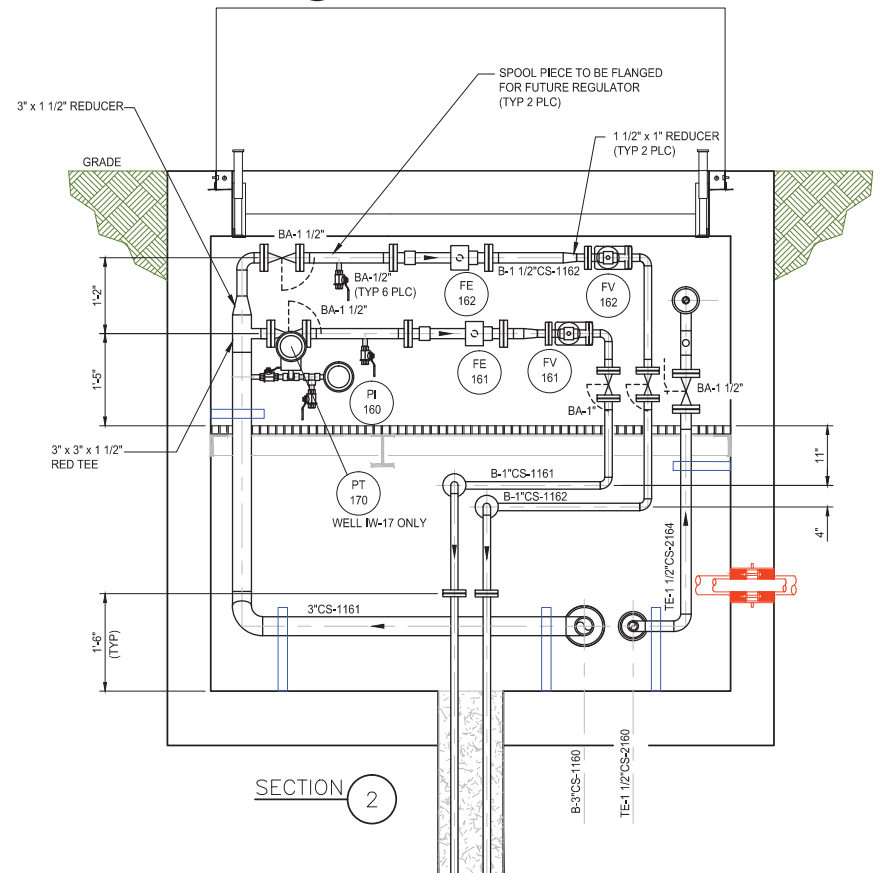
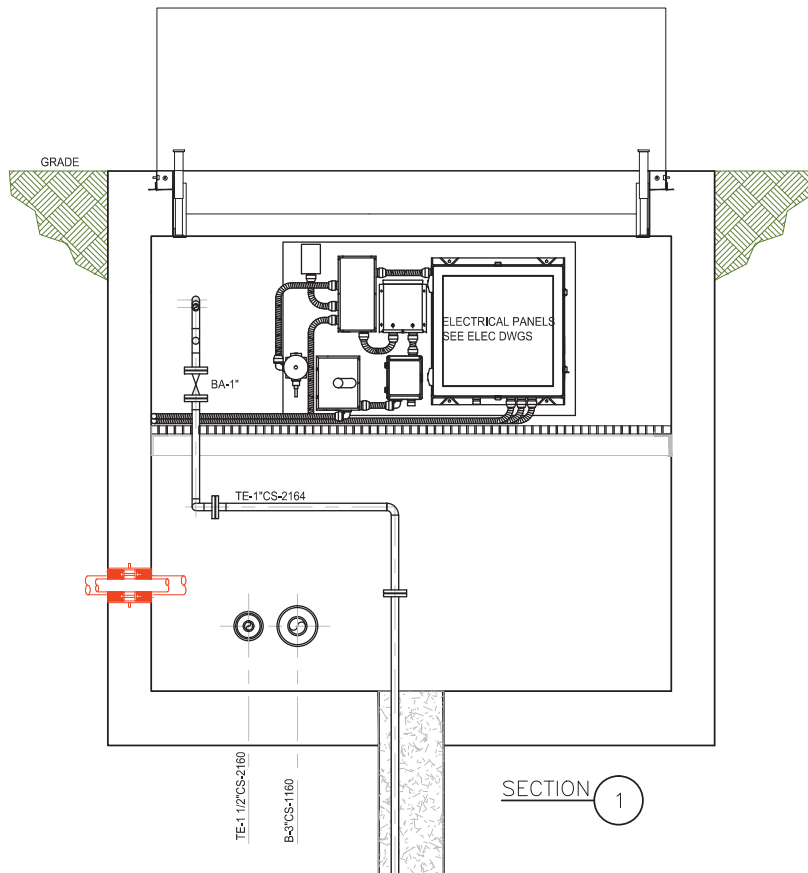
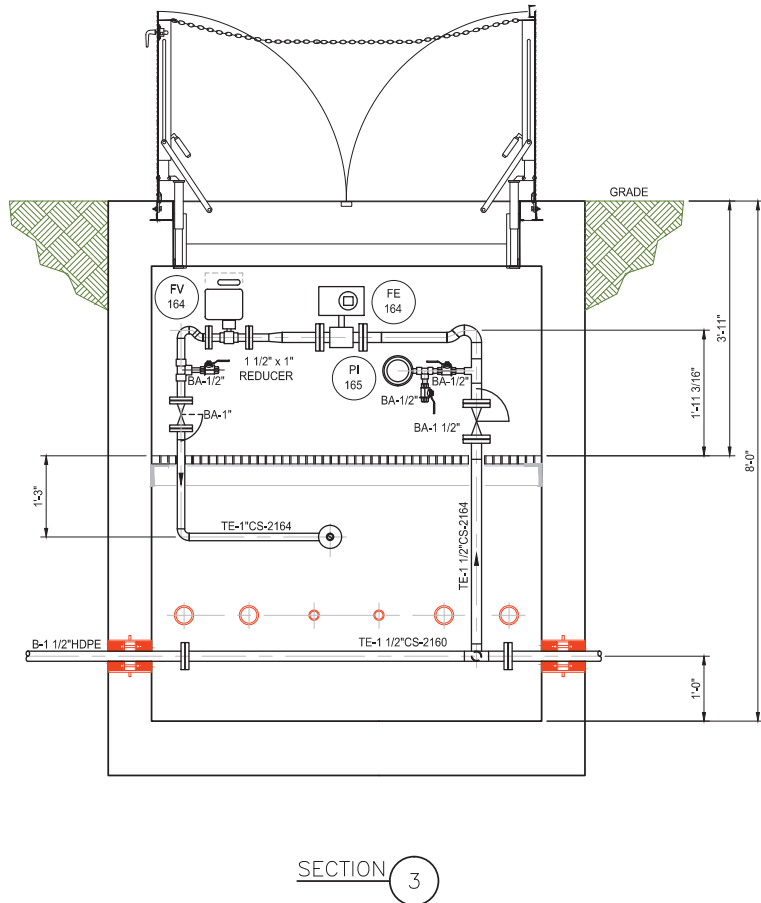
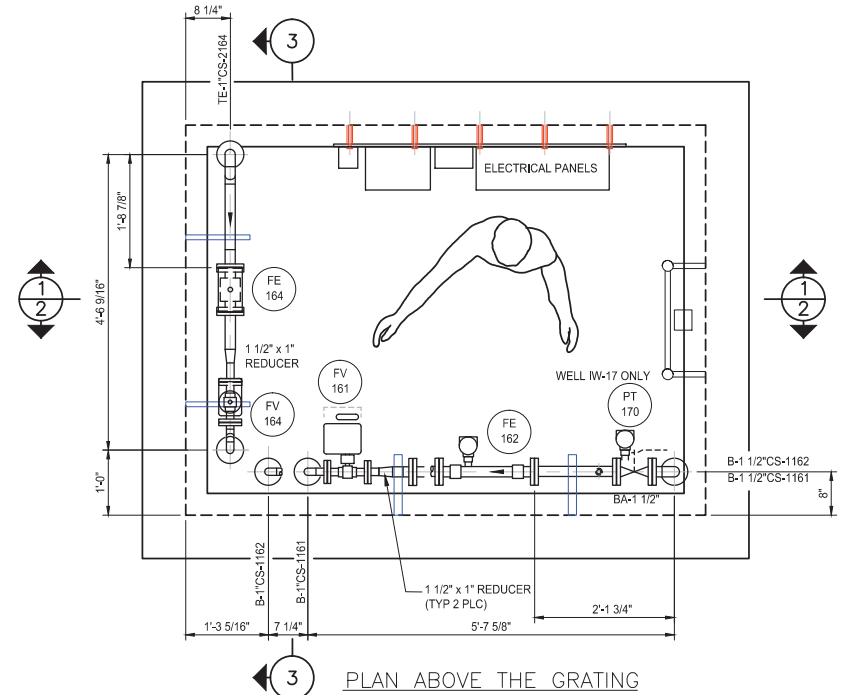
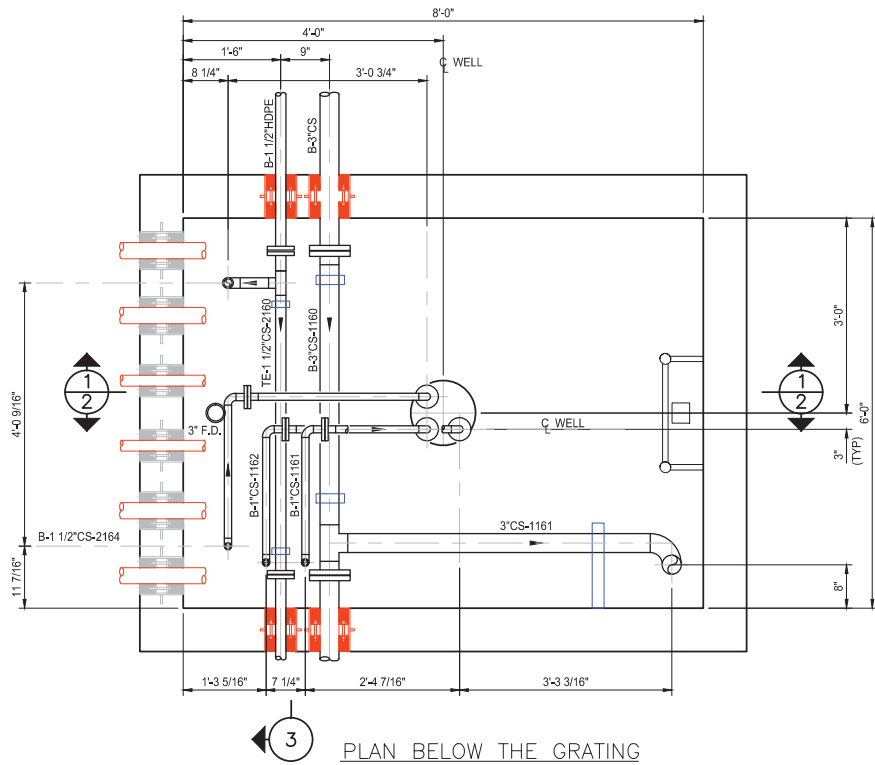
**CRA Infrastructure & Engineering, Inc.**

Source Reference:	Date:
Project Manager: J. KAY	Reviewed By:
Scale:	Project No:
NONE	06883-00
Designed By:	Report No:
	056
Drawn By:	Drawing No:
	MP-05

06883-00(056)MP-BU013 SEP 25/2012



WELL NUMBER	LINE NUMBER	INSTRUMENT NUMBER					"TIE POINT" NUMBER
		PI	PT	FE	FV	FE	
IW-16	TE-1 1/2"CS-2160						TP-4, TP-56
	B-3"CS-1160	160					TP-6, TP-8
	TE-1 1/2"CS-2164	165		164	164		TP-5
	B-1 1/2"CS-1161				161	161	TP-7
IW-17	B-1 1/2"CS-1162				162	162	TP-9
	TE-1 1/2"CS-2170						TP-10, TP-57
	B-3"CS-1170	170					TP-12, TP-14
	TE-1 1/2"CS-2174	175		174	174		TP-11
IW-18	B-1 1/2"CS-1171		170		171	171	TP-13
	B-1 1/2"CS-1172				172	172	TP-15
	TE-1 1/2"CS-2180						TP-16, TP-58
	B-3"CS-1180	180					TP-18, TP-20
IW-19	TE-1 1/2"CS-2184	185		184	184		TP-17
	B-1 1/2"CS-1181				181	181	TP-19
	B-1 1/2"CS-1182				182	182	TP-21
	TE-1 1/2"CS-2190						TP-22
IW-19	B-3"CS-1190	190					TP-24
	TE-1 1/2"CS-2194	195		194	194		TP-23
	B-1 1/2"CS-1191				191	191	TP-25
	B-1 1/2"CS-1192				192	192	TP-27



AS BUILT  
RECORD DRAWING

- NOTES:
1. THE VAULT SHOWN ABOVE IS FOR WELL IW-16, ALL VAULTS WERE PIPED AS PER THIS TYPICAL DRAWING. INSTRUMENT AND LINE NUMBERS FOR THE OTHER VAULTS MAY BE FOUND ON TABLE.
  2. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
  3. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING, THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
  4. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.
  5. WATER FLOW METER FE-XX4 CONFIGURED FOR REVERSE FLOW AND INSTALLED BACKWARD.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

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IN VIOLATION OF THE NEW YORK STATE  
EDUCATION LAW EXCEPTING AS PROVIDED  
IN SECTION 7209, PART 2 OF THE LAW.

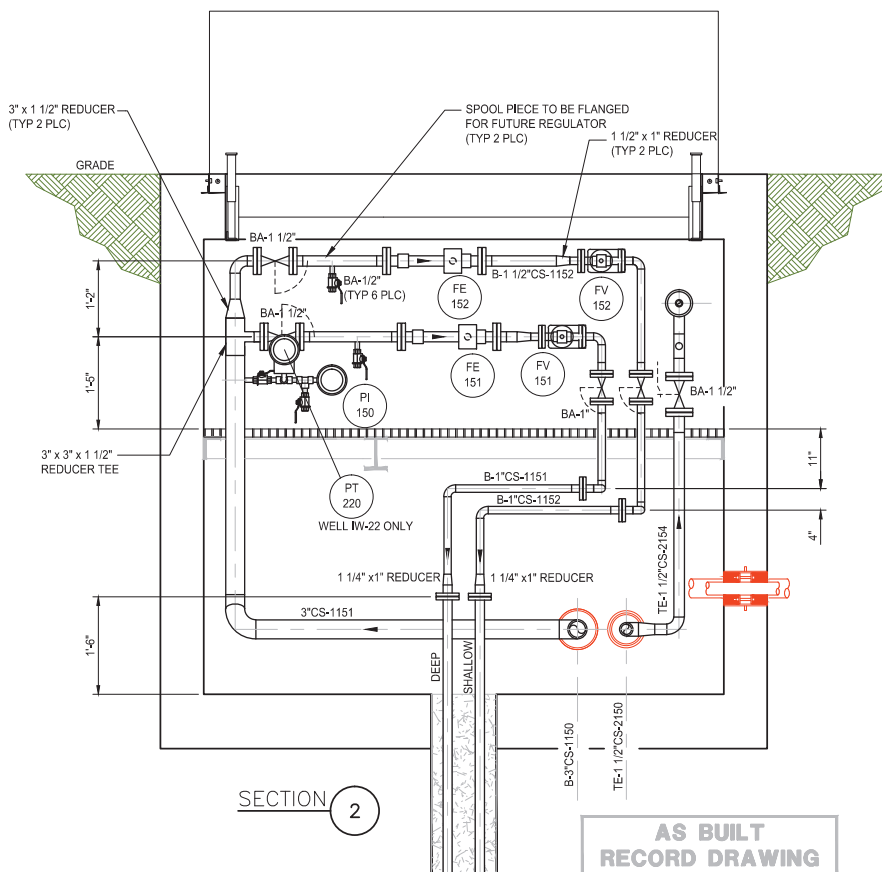
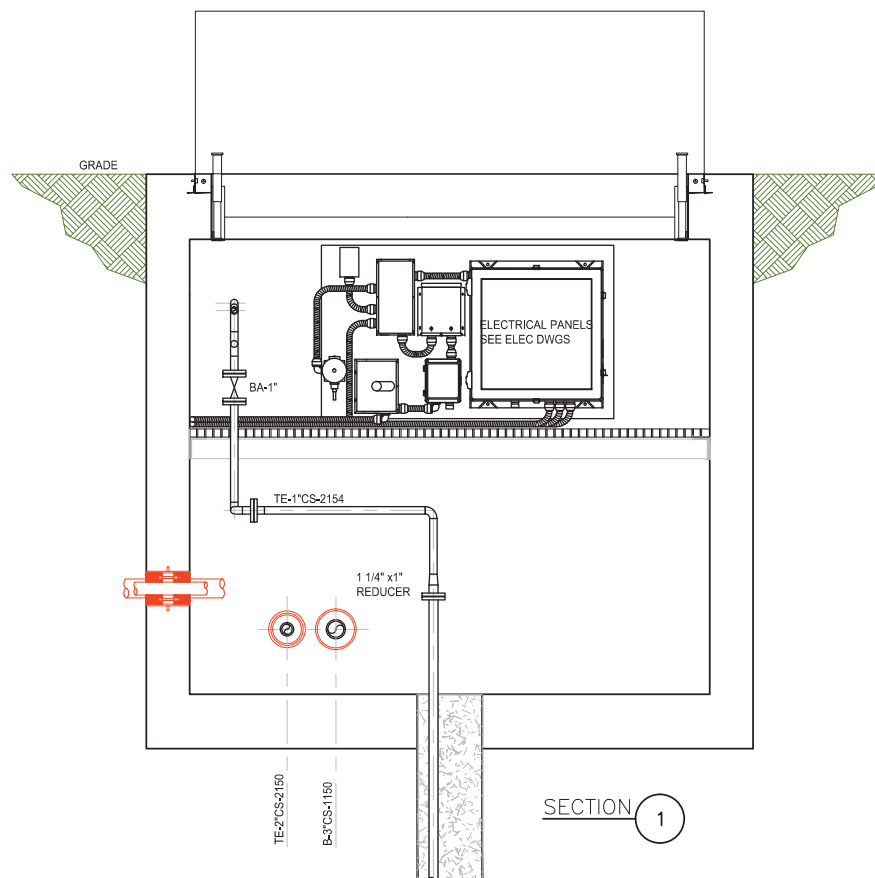
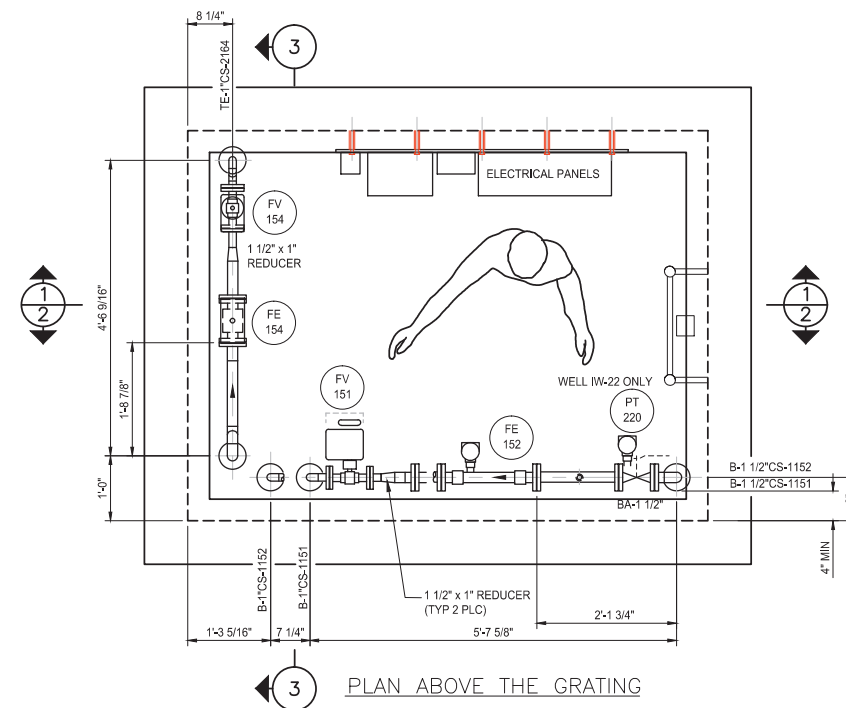
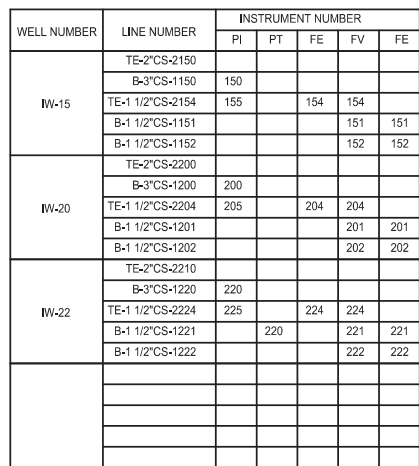
HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

INJECTION WELLS IW-16, 17, 18 & 19  
PLAN AND SECTIONS

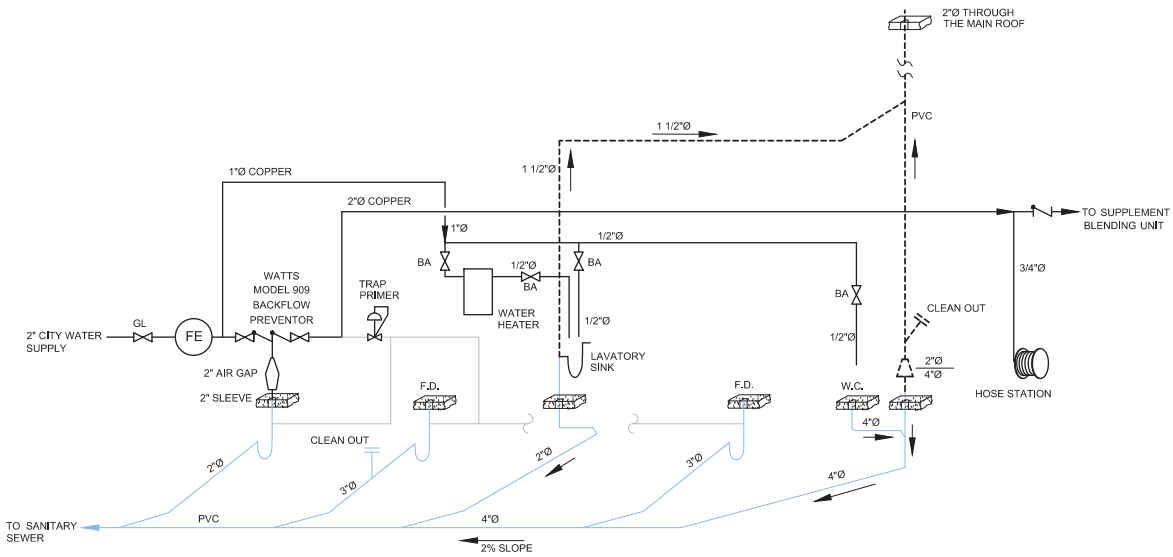
Source Reference:			Date:
Project Manager:			7-23-03
J. KAY	Reviewed By:	Designed By:	Drawn By:
		B. A. BEEBE	B. A. BEEBE
Scale:	Project No:	Report No:	Drawing No:
NONE	06883-00	056	MP-06

06883-00(055)MP-BU006 SEP 26/2012



06883-00(056)MP-BU007 SEP 26/2012





- GENERAL PLUMBING NOTES:
1. ALL WORKS MUST COMPLY WITH NEW YORK PLUMBING CODE.
  2. REFER TO WRITTEN SPECIFICATIONS FOR SPECS ON FIXTURES, PIPING MATERIALS, INSTALLATIONS, ETC., UNLESS INDICATED OTHERWISE.
  3. THESE PLANS MAKE NO ATTEMPT TO SHOW ALL ITEMS REQUIRED FOR COMPLETE INSTALLATION. ALL FIXTURES MUST BE ROUGHED IN AND INSTALLED IN STRICT ACCORDANCE WITH MFG'S SHOP DWGS AND INSTALLATION PROCEDURES. CONTRACTOR MUST FURNISH AND INSTALL ALL ITEMS, FITTINGS, AND MISCELLANEOUS HARDWARE NEEDED FOR PLUMBING-CODE COMPLIANCE AND COMPLETE OPERATIONAL SERVICE AND MAINTENANCE.

LAVATORY PLUMBING  
NOT TO SCALE

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

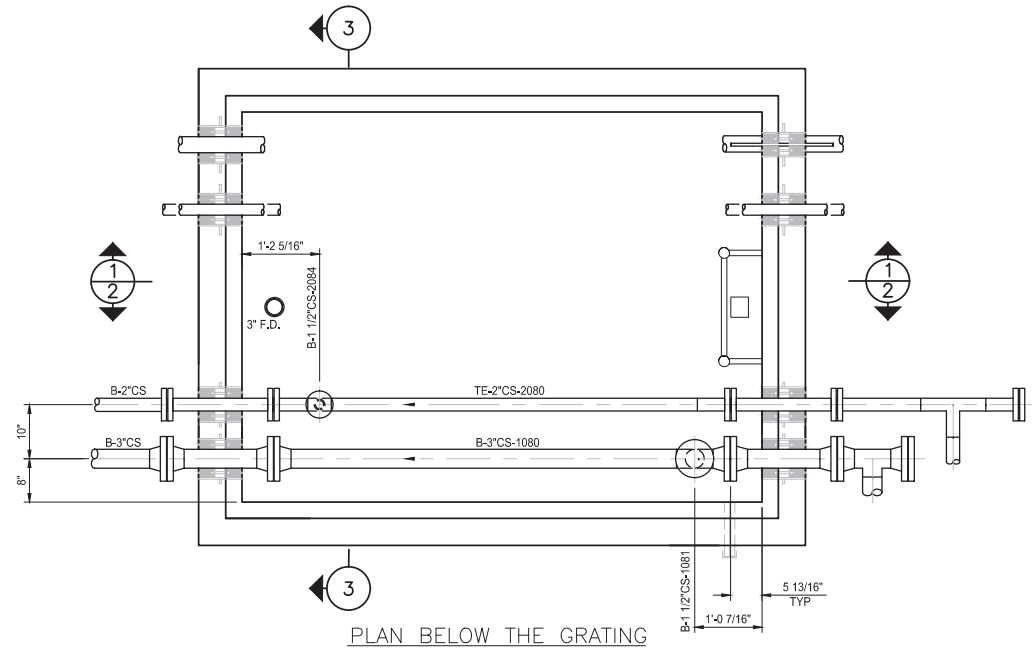
BIOSPARGE TREATMENT SYSTEM

LAVATORY PLUMBING

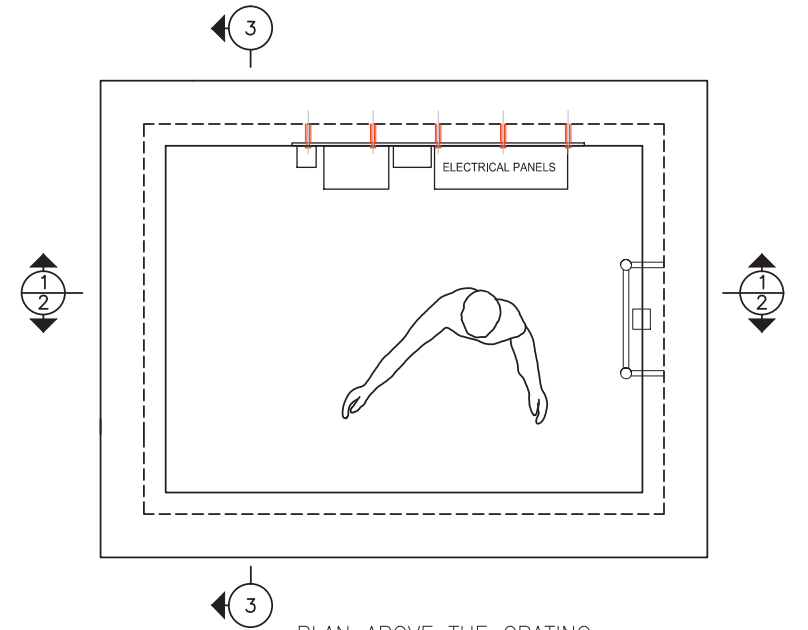


CRA Infrastructure  
& Engineering, Inc.

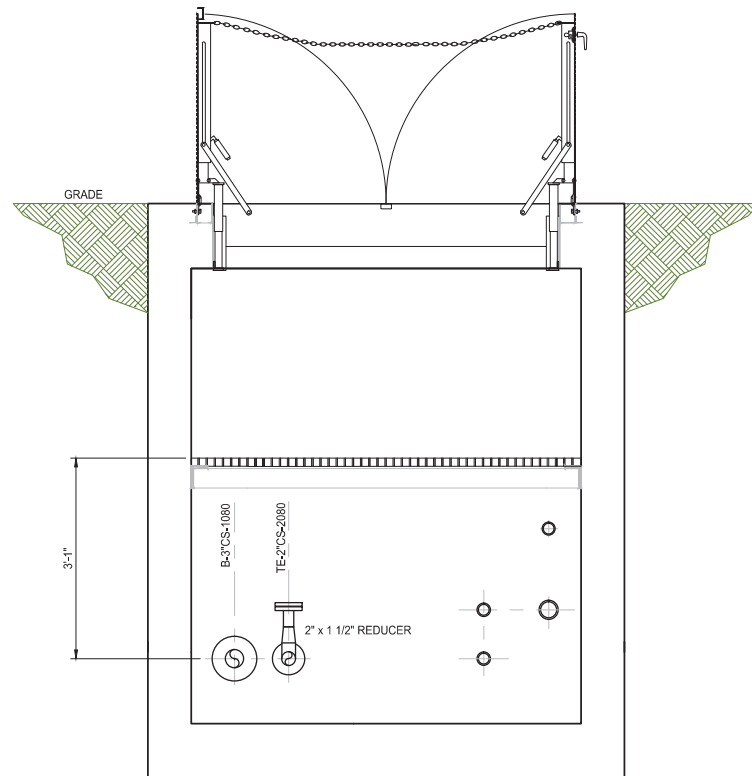
Source Reference:			Date: AUGUST 2012
Project Manager: J. KAY	Reviewed By:	Designed By:	Drawn By:
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: MP-08



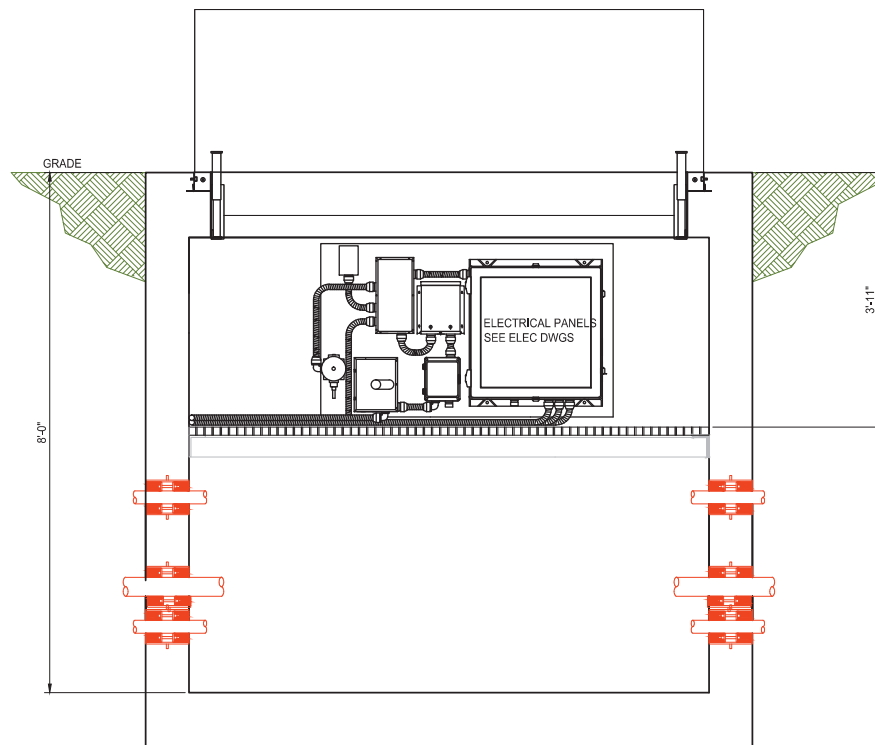
PLAN BELOW THE GRATING



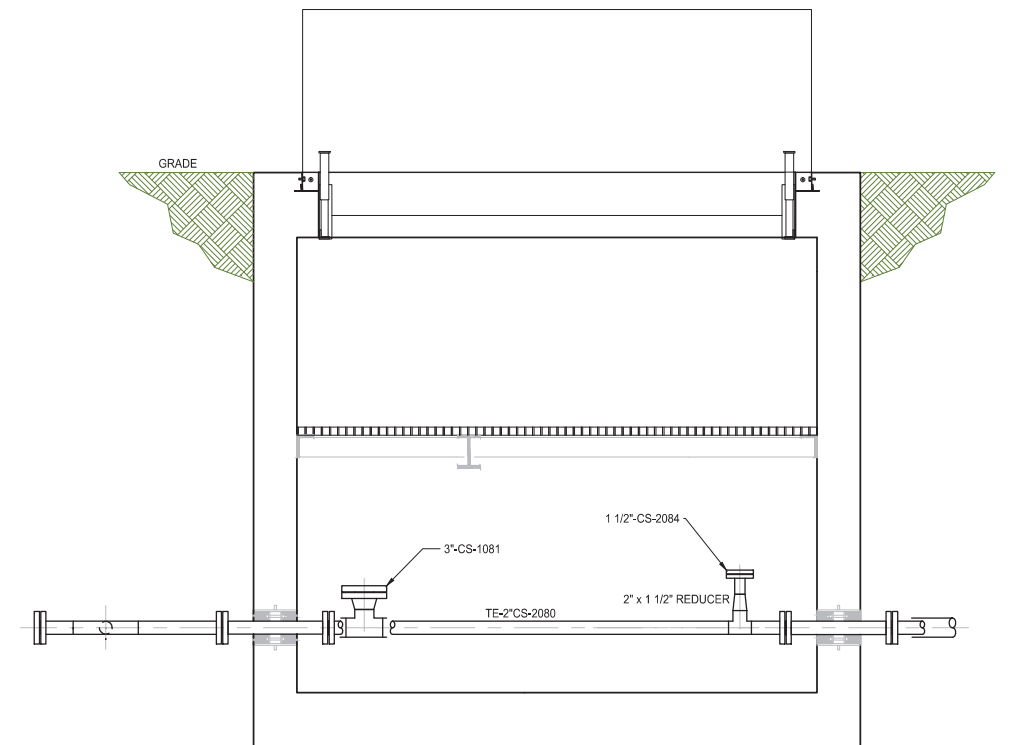
PLAN ABOVE THE GRATING



SECTION 3



SECTION 1



SECTION 2

AS BUILT  
RECORD DRAWING

NOTES:

1. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
2. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
3. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

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No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

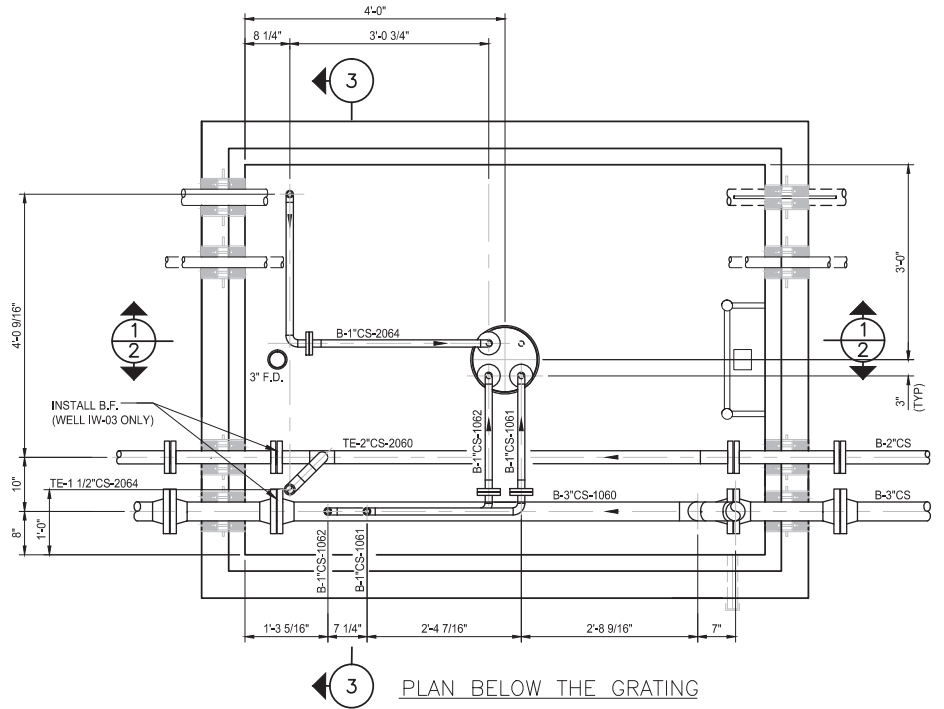
BIOSPARGE TREATMENT SYSTEM

INJECTION WELL IW-08  
PLAN AND SECTIONS

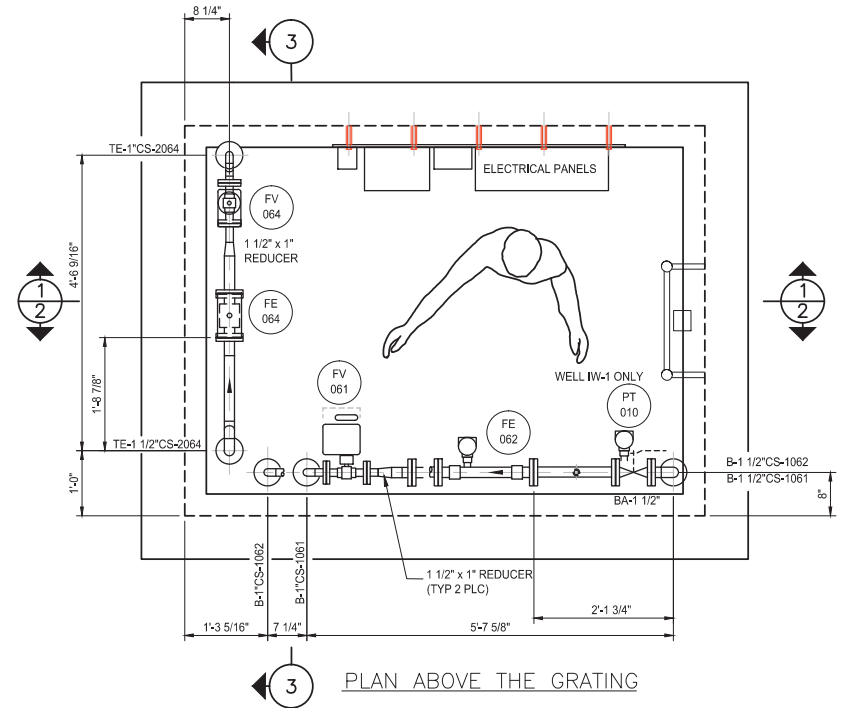
CRA Infrastructure & Engineering, Inc.			Date:
Source Reference:			7-23-03
Project Manager:	Reviewed By:	Designed By:	Drawn By:
J. KAY	B. A. BEEBE	B. A. BEEBE	B. A. BEEBE
Scale:	Project No:	Report No:	Drawing No:
NONE	06883-00	056	MP-09



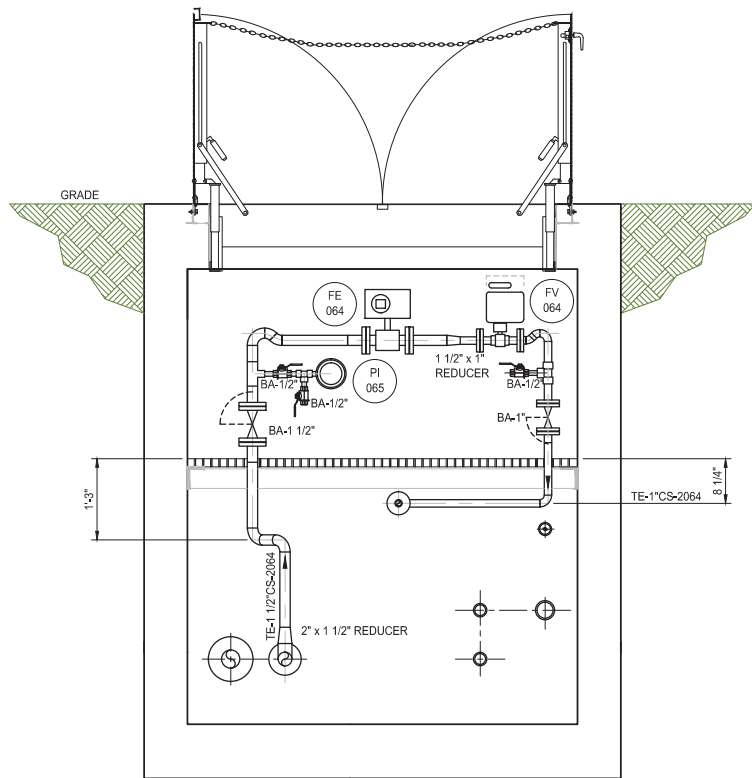
WELL NUMBER	LINE NUMBER	INSTRUMENT NUMBER					TIE POINT NUMBER
		PI	PT	FE	FV	FE	
IW-01	TE-2"CS-2010						TP-72
	B-3"CS-1010	010					TP-71
	TE-1 1/2"CS-2014	015		014	014		
	B-1 1/2"CS-1011		010		011	011	
IW-02	B-1 1/2"CS-1012				012	012	TP-67,TP-69
	TE-2"CS-2020						TP-69,TP-70
	B-3"CS-1020	020					
	TE-1 1/2"CS-2024	025		024	024		
IW-03	B-1 1/2"CS-1021				021	021	
	B-1 1/2"CS-1022				022	022	
	TE-2"CS-2030						TP-64,TP-66
	B-3"CS-1030	030					TP-63,TP-65
IW-04	TE-1 1/2"CS-2034	035		034	034		
	B-1 1/2"CS-1031				031	031	
	B-1 1/2"CS-1032				032	032	
	TE-2"CS-2040						TP-45,TP-47
IW-05	B-3"CS-1040	040					TP-44,TP-46
	TE-1 1/2"CS-2044	045		044	044		
	B-1 1/2"CS-1041				041	041	
	B-1 1/2"CS-1042				042	042	
IW-06	TE-2"CS-2050						TP-41,TP-43
	B-3"CS-1050	050					TP-40,TP-42
	TE-1 1/2"CS-2054	055		054	054		
	B-1 1/2"CS-1051				051	051	
IW-07	B-1 1/2"CS-1052				052	052	
	TE-2"CS-2060						TP-37,TP-39
	B-3"CS-1060	060					TP-36,TP-38
	TE-1 1/2"CS-2064	065		064	064		
IW-08	B-1 1/2"CS-1061				061	061	
	B-1 1/2"CS-1062				062	062	
	TE-2"CS-2070						TP-33,TP-35
	B-3"CS-1070	070					TP-32,TP-34
IW-09	TE-1 1/2"CS-2074	075		074	074		
	B-1 1/2"CS-1071				071	071	
	B-1 1/2"CS-1072				072	072	



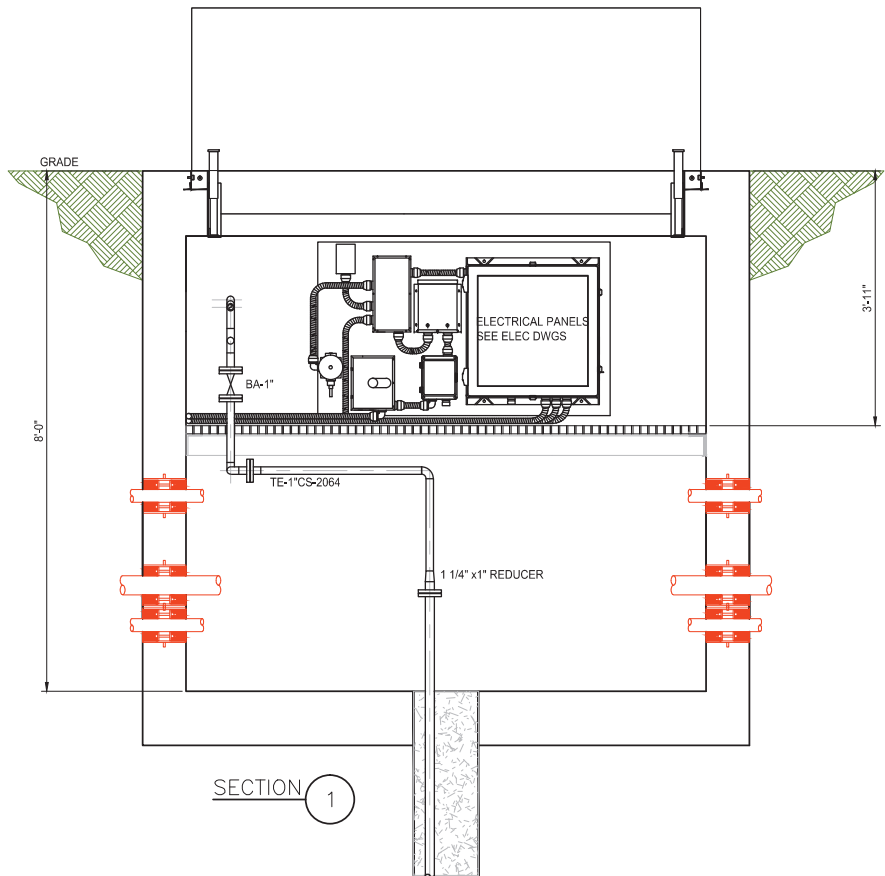
PLAN BELOW THE GRATING



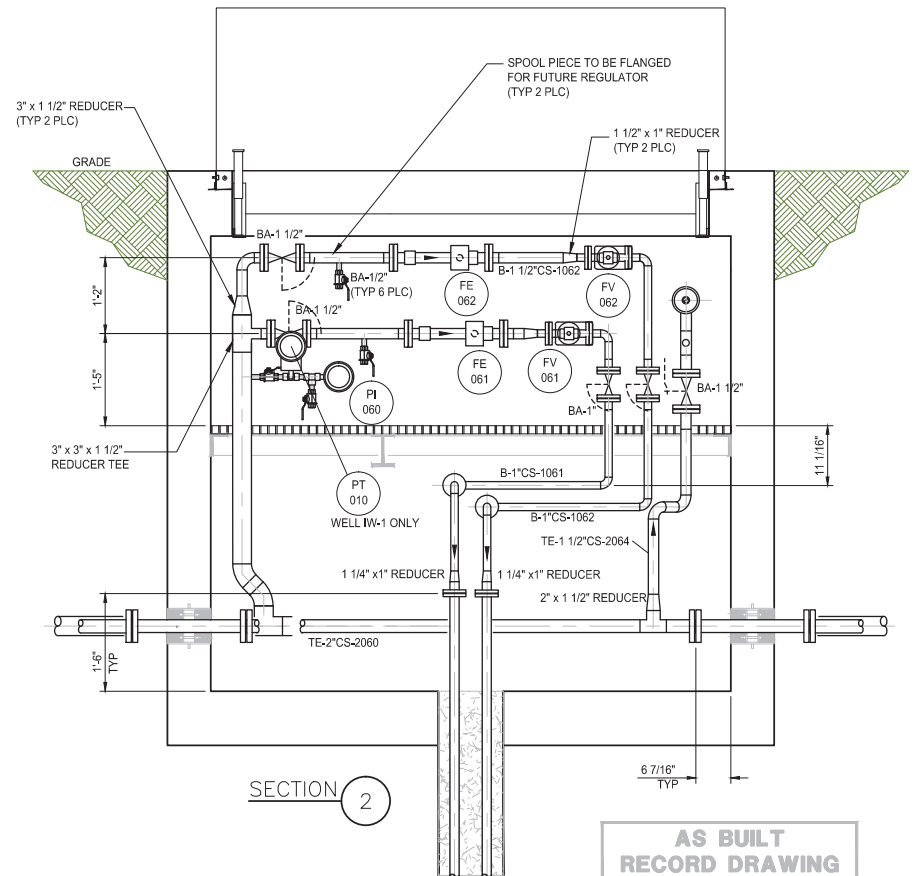
PLAN ABOVE THE GRATING



SECTION 3



SECTION 1



SECTION 2

AS BUILT  
RECORD DRAWING

NOTES:

1. THE VAULT SHOWN ABOVE IS FOR WELL IW-06. ALL VAULTS WERE PIPED AS PER THIS TYPICAL DRAWING. INSTRUMENT AND LINE NUMBERS FOR THE OTHER VAULTS MAY BE FOUND ON TABLE.
2. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
3. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
4. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV	
No	Revision	Date	Initial	

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HOOKE/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

INJECTION WELLS IW-01 THRU IW-07  
PLANS AND SECTIONS



Source Reference:			Date:
			7-23-03
Project Manager:	Reviewed By:	Designed By:	Drawn By:
J. KAY		B. A. BEEBE	B. A. BEEBE
Scale:	Project No:	Report No:	Drawing No:
NONE	06883-00	056	MP-10

REV	SIZE & LINE No.	DESCRIPTION (TO & FROM)	PIPING DRAWING	P & ID DRAWING	DATE COMPLETED	TRACED		INSULATION			TIE POINT No.	REMARKS
						STEAM	ELECTRICAL	THK	SPEC	JACKET		
	3"CS-1000	PRIMARY AIR COMPR TO COMPR AIR DRYER	MP-02, 03 & 04	EF-01 S1		N	N	N	N	N		INSIDE BLDG
	3"CS-1001	3"CS-1002 TO 3"CS-1080	MP-01	EF-01 S1		N	N	N	N	N		NORTH, UNDERGROUND
	3"CS-1002	COMPR AIR DRYER TO 3"CS-1160	MP-02, 03 & 04	EF-01 S1		N	N	N	N	N		INSIDE BLDG
	3"CS-1010	3"CS-1020 (IW-02) TO END	MP-01, 10	EF-08		N	N	N	N	N		IW-01
	3"CS-1011	3"CS-1010 TO WELL	MP-10	EF-08		N	N	N	N	N		IW-01
	3"CS-1012	3"CS-1011 TO WELL	MP-10	EF-08		N	N	N	N	N		IW-01
	3"CS-1020	3"CS-1030 (IW-03) TO 3"CS-1010 (IW-01)	MP-01, 10	EF-08		N	N	N	N	N		IW-02
	3"CS-1021	3"CS-1020 TO WELL	MP-10	EF-08		N	N	N	N	N		IW-02
	3"CS-1022	3"CS-1021 TO WELL	MP-10	EF-08		N	N	N	N	N		IW-02
	3"CS-1030	3"CS-1040 (IW-04) TO 3"CS-1020 (IW-02)	MP-01, 10	EF-07		N	N	N	N	N		IW-03
	3"CS-1031	3"CS-1030 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-03
	3"CS-1032	3"CS-1031 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-03
	3"CS-1040	3"CS-1050 (IW-05) TO 3"CS-1030 (IW-03)	MP-01, 10	EF-07		N	N	N	N	N		IW-04
	3"CS-1041	3"CS-1040 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-04
	3"CS-1042	3"CS-1041 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-04
	3"CS-1050	3"CS-1060 (IW-06) TO 3"CS-1040 (IW-04)	MP-01, 10	EF-07		N	N	N	N	N		IW-05
	3"CS-1051	3"CS-1050 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-05
	3"CS-1052	3"CS-1051 TO WELL	MP-10	EF-07		N	N	N	N	N		IW-05
	3"CS-1060	3"CS-1070 (IW-07) TO 3"CS-1050 (IW-05)	MP-01, 10	EF-06		N	N	N	N	N		IW-06
	3"CS-1061	3"CS-1060 TO WELL	MP-10	EF-06		N	N	N	N	N		IW-06
	3"CS-1062	3"CS-1061 TO WELL	MP-10	EF-06		N	N	N	N	N		IW-06
	3"CS-1070	3"CS-1080 (IW-08) TO 3"CS-1060 (IW-06)	MP-01, 10	EF-06		N	N	N	N	N		IW-07
	3"CS-1071	3"CS-1070 TO WELL	MP-10	EF-06		N	N	N	N	N		IW-07
	3"CS-1072	3"CS-1071 TO WELL	MP-10	EF-06		N	N	N	N	N		IW-07
	3"CS-1080	3"CS-1001 TO 3"CS-1070	MP-01, 09	EF-06		N	N	N	N	N		IW-08

REV	SIZE & LINE No.	DESCRIPTION (TO & FROM)	PIPING DRAWING	P & ID DRAWING	DATE COMPLETED	TRACED		INSULATION			TIE POINT No.	REMARKS
						STEAM	ELECTRICAL	THK	SPEC	JACKET		
	3"CS-1150	3"CS-1060 TO 3"CS-1140 (IW-15)	MP-01, 06	EF-01 S1, 05		N	N	N	N	N		IN TRENCH
	3"CS-1151	3"CS-1150 TO WELL	MP-07	EF-05		N	N	N	N	N		IW-15
	3"CS-1152	3"CS-1151 TO WELL	MP-07	EF-05		N	N	N	N	N		IW-15
	3"CS-1160	3"CS-1002 TO 3"CS-1170 (IW-17)	MP-01, 06	EF-01 S1, 02		N	N	N	N	N		IW-16
	3"CS-1161	3"CS-1160 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-16
	3"CS-1162	3"CS-1161 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-16
	3"CS-1170	3"CS-1160 (IW-16) TO 3"CS-1180 (IW-18)	MP-01, 06	EF-01 S1, 02		N	N	N	N	N		IW-17
	3"CS-1171	3"CS-1170 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-17
	3"CS-1172	3"CS-1171 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-17
	3"CS-1180	3"CS-1170 (IW-17) TO 3"CS-1190 (IW-19)	MP-01, 06	EF-01 S1, 02		N	N	N	N	N		IW-18
	3"CS-1181	3"CS-1180 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-18
	3"CS-1182	3"CS-1181 TO WELL	MP-06	EF-02		N	N	N	N	N		IW-18
	3"CS-1190	3"CS-1180 (IW-18) TO 3"CS-1200 (IW-20)	MP-01, 06	EF-03		N	N	N	N	N		IW-19
	3"CS-1191	3"CS-1190 TO WELL	MP-06	EF-03		N	N	N	N	N		IW-19
	3"CS-1192	3"CS-1191 TO WELL	MP-06	EF-03		N	N	N	N	N		IW-19
	3"CS-1200	3"CS-1190 (IW-19) TO 3"CS-1210 (IW-21)	MP-01, 07	EF-03		N	N	N	N	N		IW-20
	3"CS-1201	3"CS-1200 TO WELL	MP-07	EF-03		N	N	N	N	N		IW-20
	3"CS-1202	3"CS-1201 TO WELL	MP-07	EF-03		N	N	N	N	N		IW-20
	3"CS-1210	3"CS-1200 (IW-20) TO 3"CS-1220 (IW-22)	MP-01, 07	EF-03		N	N	N	N	N		IW-21
	3"CS-1211	3"CS-1210 TO WELL	MP-07	EF-03		N	N	N	N	N		IW-21
	3"CS-1212	3"CS-1211 TO WELL	MP-07	EF-03		N	N	N	N	N		IW-21
	3"CS-1220	3"CS-1210 (IW-21) TO END	MP-01, 07	EF-04		N	N	N	N	N		IW-22
	3"CS-1221	3"CS-1220 TO WELL	MP-07	EF-04		N	N	N	N	N		IW-22
	3"CS-1222	3"CS-1221 TO WELL	MP-07	EF-04		N	N	N	N	N		IW-22

REV	SIZE & LINE No.	DESCRIPTION (TO & FROM)	PIPING DRAWING	P & ID DRAWING	DATE COMPLETED	TRACED		INSULATION			TIE POINT No.	REMARKS
						STEAM	ELECTRICAL	THK	SPEC	JACKET		
	1 1/2"CS-2000	WATER SUPPLY TO 2"HDPE-2080	MP-02, 04	EF-01 S2		N	N	N	N	N		INSIDE BLDG
	1"CS-2004	1 1/2"CS-2000 TO SUPPLEMENT BLENDING UNIT	MP-02, 04	EF-01 S2		N	N	N	N	N		INSIDE BLDG
	2"CS-2010	2"HDPE-2030 (IW-03) TO END	MP-01, 10	EF-08			Y					IW-01
	1 1/2"CS-2014	2"HDPE-2010 TO WELL	MP-10	EF-08			Y					IW-01
	2"CS-2020	2"HDPE-2030 (IW-03) TO 2"HDPE-2010 (IW-01)	MP-01, 10	EF-08			Y					IW-02
	1 1/2"CS-2024	2"HDPE-2020 TO WELL	MP-10	EF-08			Y					IW-02
	2"CS-2030	2"HDPE-2040 (IW-04) TO 2"HDPE-2020 (IW-02)	MP-01, 10	EF-07			Y					IW-03
	1 1/2"CS-2034	2"HDPE-2030 TO WELL	MP-10	EF-07			Y					IW-03
	2"CS-2040	2"HDPE-2050 (IW-05) TO 2"HDPE-2030 (IW-03)	MP-01, 10	EF-07			Y					IW-04
	1 1/2"CS-2044	2"HDPE-2040 TO WELL	MP-10	EF-07			Y					IW-04
	2"CS-2050	2"HDPE-2060 (IW-06) TO 2"HDPE-2040 (IW-04)	MP-01, 10	EF-07			Y					IW-05
	1 1/2"CS-2054	2"HDPE-2050 TO WELL	MP-10	EF-07			Y					IW-05
	2"CS-2060	2"HDPE-2070 (IW-07) TO 2"HDPE-2050 (IW-05)	MP-01, 10	EF-06			Y					IW-06
	1 1/2"CS-2064	2"HDPE-2060 TO WELL	MP-10	EF-06			Y					IW-06
	2"CS-2070	2"HDPE-2080 (IW-08) TO 2"HDPE-2060 (IW-06)	MP-01, 10	EF-06			Y					IW-07
	1 1/2"CS-2074	2"HDPE-2070 TO WELL	MP-10	EF-06			Y					IW-07
	2"HDPE-2080	1 1/2"CS-2000 TO 2"HDPE-2070 (IW-07)	MP-01, 09	EF-06			Y					IW-08

REV	SIZE & LINE No.	DESCRIPTION (TO & FROM)	PIPING DRAWING	P & ID DRAWING	DATE COMPLETED	TRACED		INSULATION			TIE POINT No.	REMARKS
						STEAM	ELECTRICAL	THK	SPEC	JACKET		
	2"HDPE-2150	1 1/2"HDPE-2160 TO 2"HDPE-2140	MP-01, 07	EF-01 S2, 05			Y					IN TRENCH
	1"CS-2154	1 1/2"CS-2150 TO WELL	MP-07	EF-05			Y					IW-15
	1 1/2"HDPE-2160	1 1/2"HDPE-2002 TO 1 1/2"HDPE-2170 (IW-17)	MP-01, 06	EF-01 S1, 02			Y					IW-16
	1 1/2"CS-2164	1 1/2"CS-2160 TO WELL	MP-06	EF-02			Y					IW-16
	1 1/2"HDPE-2170	1 1/2"HDPE-2160 (IW-16) TO 1 1/2"HDPE2180 (IW-18)	MP-01, 06	EF-02			Y					IW-17
	1 1/2"CS-2174	1 1/2"CS-2170 TO WELL	MP-06	EF-02			Y					IW-17
	1 1/2"HDPE-2180	1 1/2"HDPE-2170 (IW-17) TO 1 1/2"HDPE2190 (IW-19)	MP-01, 06	EF-02			Y					IW-18
	1 1/2"CS-2184	1 1/2"CS-2180 TO WELL	MP-06	EF-02			Y					IW-18
	1 1/2"HDPE-2190	1 1/2"HDPE-2180 (IW-18) TO 1 1/2"HDPE2200 (IW-20)	MP-01, 06	EF-03			Y					IW-19
	1 1/2"CS-2194	2"CS-2190 TO WELL	MP-06	EF-03			Y					IW-19
	1 1/2"HDPE-2200	2"HDPE-2190 (IW-19) TO 2"HDPE2210 (IW-21)	MP-01, 07	EF-03			Y					IW-20
	1 1/2"CS-2204	2"CS-2200 TO WELL	MP-07	EF-03			Y					IW-20
	2"HDPE-2210	2"HDPE-2200 (IW-20) TO 2"HDPE2220 (IW-22)	MP-01, 07	EF-03			Y					IW-21
	1 1/2"CS-2214	2"CS-2210 TO WELL	MP-07	EF-03			Y					IW-21
	2"HDPE-2220	1 1/2"HDPE-2210 (IW-21) TO END	MP-01, 07	EF-04			Y					IW-22
	1 1/2"CS-2224	2"CS-2220 TO WELL	MP-07	EF-04			Y					IW-22

AS BUILT  
RECORD DRAWING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

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HOOKER/RUCO SITE  
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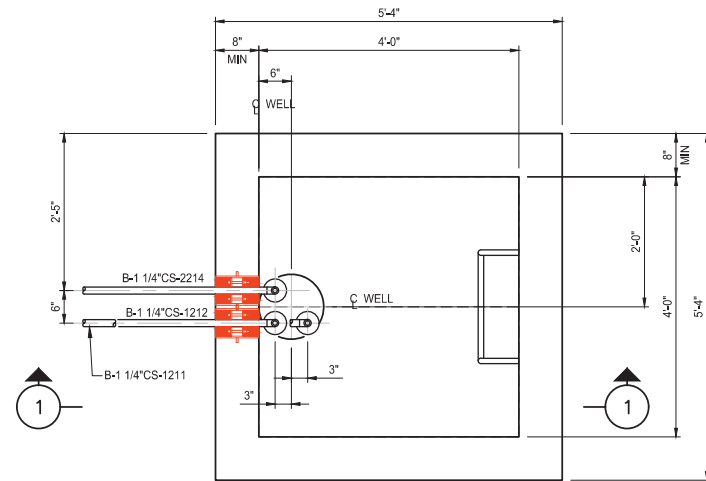
BIOSPARGE TREATMENT SYSTEM

LINE LIST

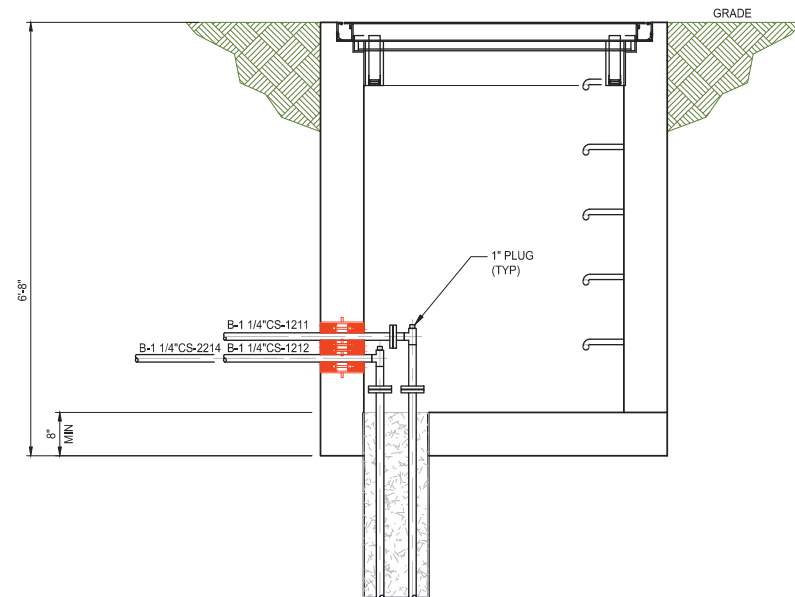


**CRA Infrastructure & Engineering, Inc.**

Source Reference:			Date: SEPTEMBER 2003
Project Manager: J. KAY	Reviewed By:	Designed By: B. A. BEEBE	Drawn By: B. A. BEEBE
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: MP-12



PLAN VIEW



SECTION 1

AS BUILT  
RECORD DRAWING

- NOTES:
1. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
  2. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
  3. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
1	AS BUILT	08/29/12	LV

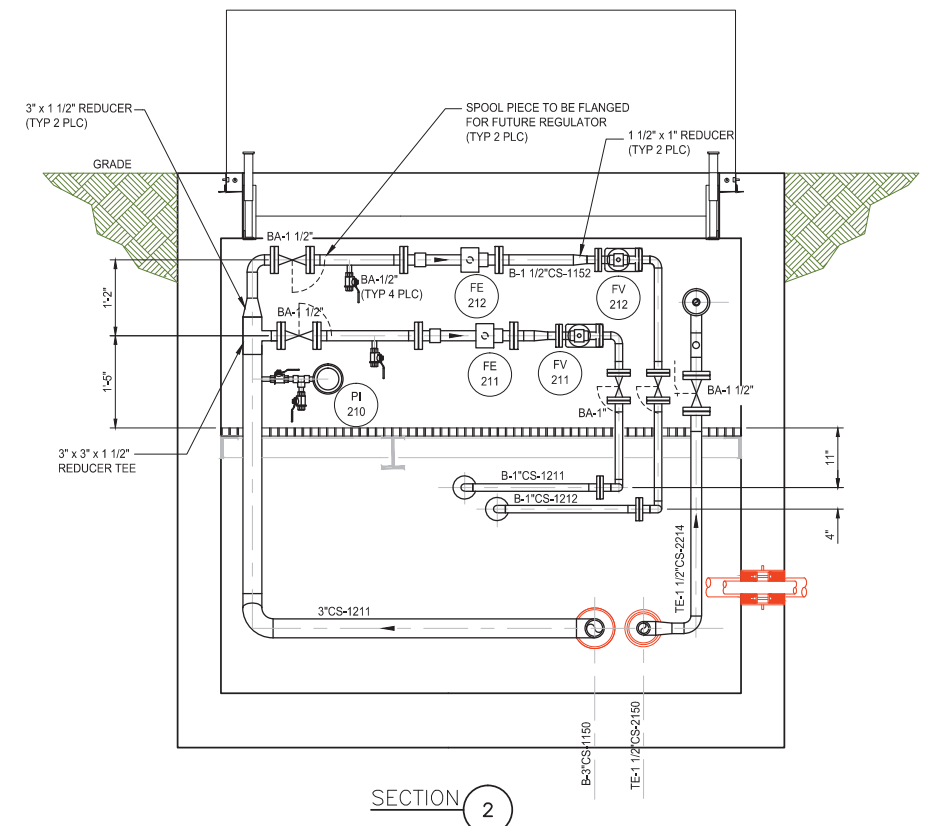
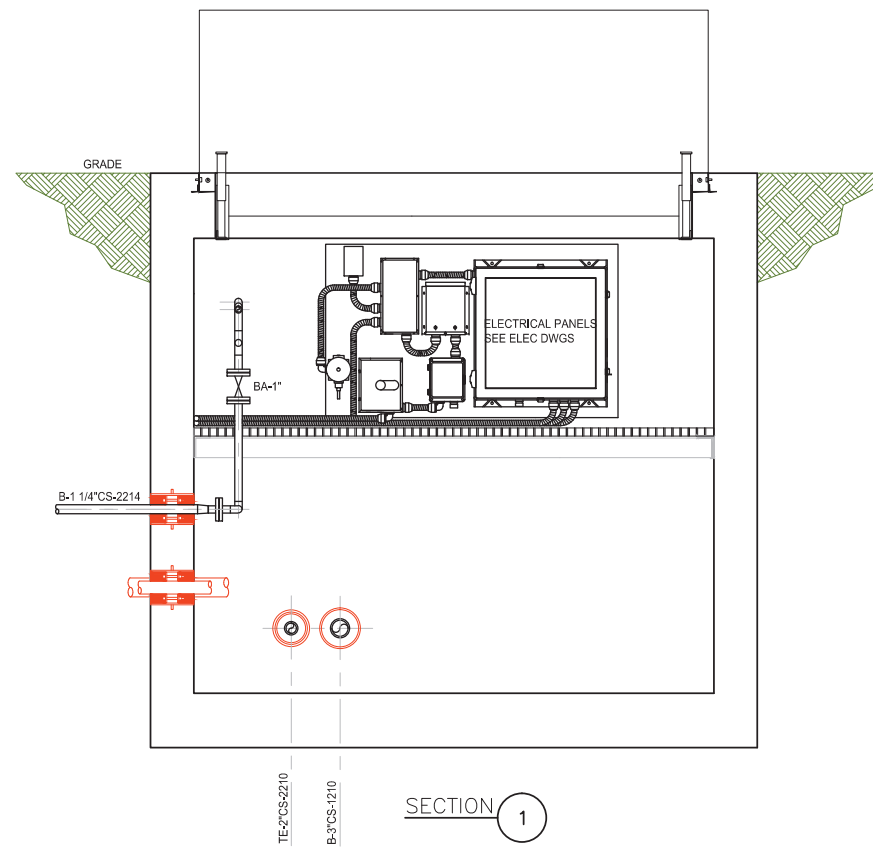
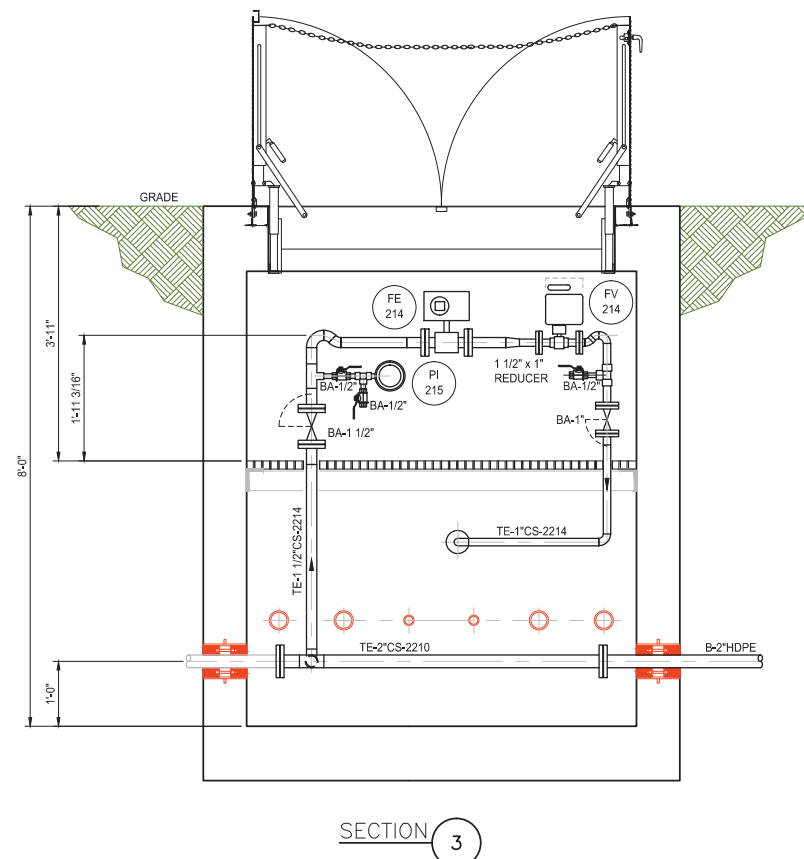
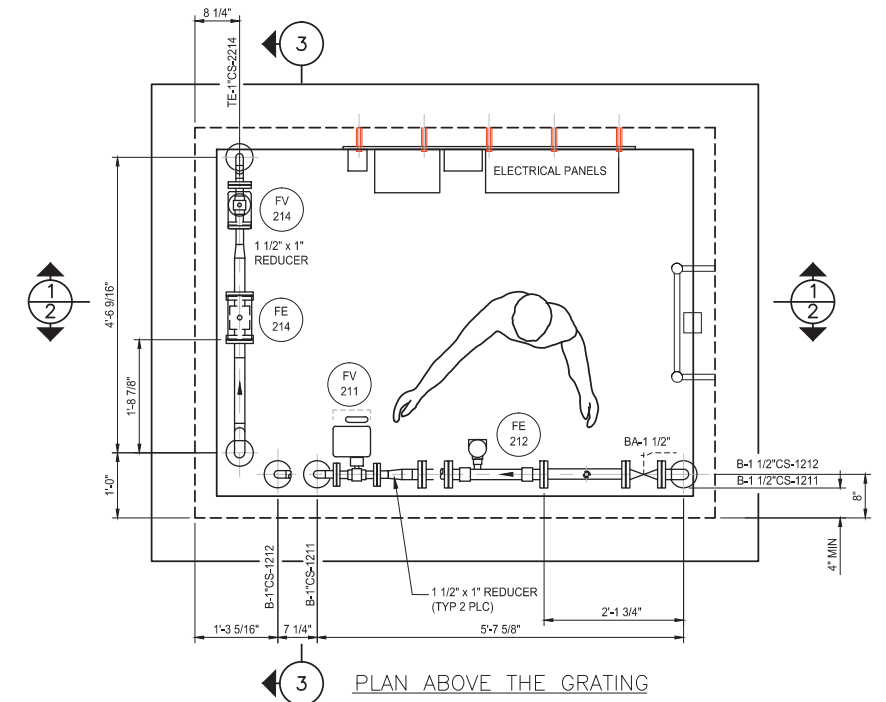
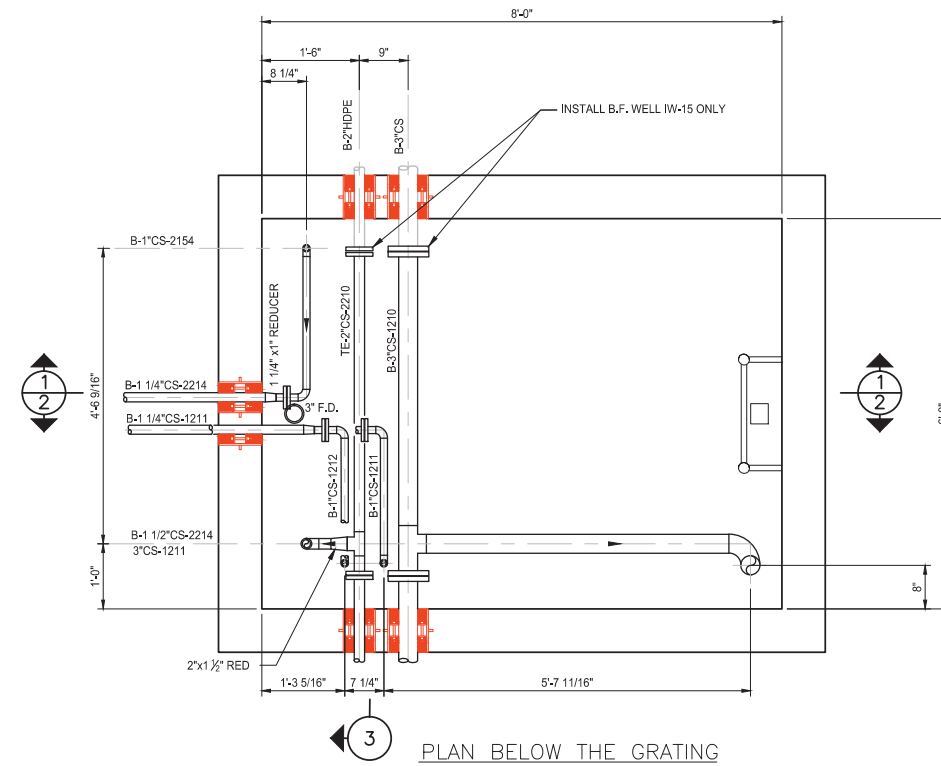
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HOOKER/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM


INJECTION WELLS IW-21A  
PLAN AND SECTIONS

CRA Infrastructure & Engineering, Inc.			
Source Reference:			Date: 7-23-03
Project Manager: J. KAY	Reviewed By: B. A. BEEBE	Designed By: B. A. BEEBE	Drawn By: B. A. BEEBE
Scale: NONE	Project No: 06883-00	Report No: 056	Drawing No: MP-13



NOTES:

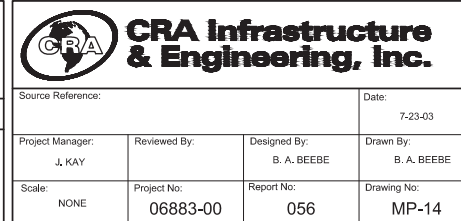
1. WELLS IW-01 THRU IW-07 ARE LOCATED NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE NORTH SIDE OF THE VAULT.
2. WELLS IW-15 THRU IW-22 ARE LOCATED JUST NORTH OF THE CONTROL BUILDING. THESE VAULTS ARE POSITIONED WITH THE WELL LOCATED ON THE SOUTH SIDE OF THE VAULT.
3. ALL AIR, LIQUID, CONTROL, AND ELECTRICAL LINES PASS THRU THE VAULTS, EXCEPT IW-1, IW-8, IW-15, AND IW-22. CONTRACTOR PLUGGED ANY ADDITIONAL HOLES IN THESE VAULTS.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.			
			
1	AS BUILT	08/29/12	LV
No	Revision	Date	Initial

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HOOKE/RUCO SITE  
HICKSVILLE, NEW YORK

BIOSPARGE TREATMENT SYSTEM

INJECTION WELLS IW-21  
PLAN AND SECTIONS

## APPENDIX B

### STRATIGRAPHY, GEOPHYSICAL, AND WELL INSTRUMENTATION LOGS



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 22

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6822  
 CLIENT GSH  
 LOCATION Hicksville, NV

DRILLING CONTRACTOR Boert Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-1  
 DATE/TIME STARTED 4/18/11  
 DATE/TIME COMPLETED 4/20/11  
 DRILLING METHOD Sanic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E L T H I N G D	SAMPLE DETAILS						S I N T E R V A L	P I D /	P I D /	C H E M I C A L	A N A L Y S I S	C R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLT SPOON BLOW (RECORD N-VALUES & RECOVERIES)											
						6"	6"	6"	6"	N	R						
0		37	tan brown medium-coarse sand + gravel Some fine sand + silt, loose										4.3				
37		57	tan brown medium sand, loose <del>to</del> 50'										0.6				
57		77	tan brown fine-medium sand, loose										0.3				
77		90	tan brown fine-medium sand, loose										0.0				
90		96	orange brown medium-coarse sand + gravel Some silt, loose										0.0				
96		100	light brown fine sand + silt, firm										0.0				
100		108	dark gray/black silty clay, stiff										0.0				
108		117	light gray/tan brown fine sand + silt, some medium sand										0.3				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 3

PROJECT NAME Hook - Ruro  
 PROJECT NUMBER 6867  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DILLING CONTRACTOR Boart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION JW-1  
 DATE/TIME STARTED 4/18/11  
 DATE/TIME COMPLETED 4/20/11  
 DRILLING METHOD Sonic  
 CBA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D P I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
117		127				light gray medium sand, loose									
127		147	tan brown + light gray fine-medium sand slight odor, loose									1.1			
147		167	light gray + tan brown fine-medium sand, loose odor									4.0			
167		177	tan brown medium sand, loose									1.2			
177		197	light gray medium sand, loose									0.6			
197		217	tan brown fine-medium sand, some silty pockets, loose									4.1			
217		239	tan brown medium sand, some fine sand + silt, loose									2.8			
239		256	dark gray/black silty clay, st. ff									0.0			
256		277	tan brown medium sand, loose									2.7			
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____												



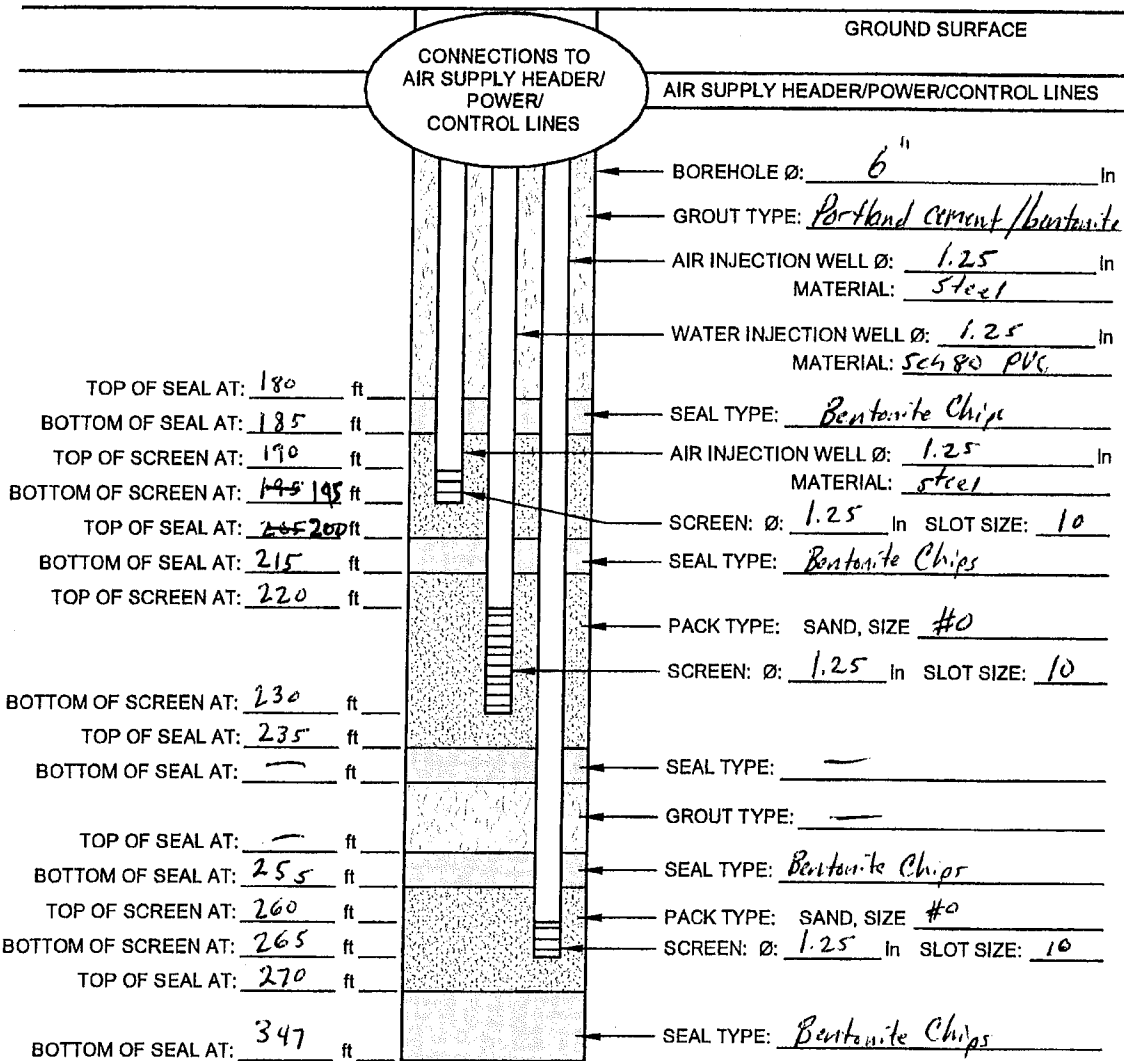
PAGE 3 OF 3

HOLE DESIGNATION IW-1  
DATE/TIME STARTED 4/15/11  
DATE/TIME COMPLETED 4/20/11  
DRILLING METHOD Sonic  
CRA SUPERVISOR S. Daly



# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Rulo HOLE DESIGNATION: IW-1  
 PROJECT No: 6883 DATE COMPLETED: 4/28/11  
 CLIENT: GSHZ DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ Plastic ☐ Other: \_\_\_\_\_  
 WATER: ☐ Stainless Steel ☒ Plastic ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6" to 347' 7" to 287'  
 DEVELOPMENT: METHOD: Air lift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 3

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6883  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-2  
 DATE/TIME STARTED 4/5/11  
 DATE/TIME COMPLETED 4/7/11  
 DRILLING METHOD sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E T H I N G D	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D / F I D  (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
0		38	tan brown medium-coarse sand & gravel some fine sand & silt										0.1		
38		58	tan brown fine-med sand, loose, little recovered 2.0 50'										0.2		
58		70	tan brown + light gray medium sand, loose										0.2		
70		78	tan brown + light gray fine sand & silt, firm										0.0		
78		98	tan brown + light gray fine sand & silt, firm										0.0		
98		102	tan brown + light gray fine sand & silt, firm										0.0		
102		114	tan brown silty clay, stiff										0.0		
114		118	tan brown medium sand, loose										0.1		
118		135	light gray & tan brown medium sand, loose										0.0		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_

NOTES  
AND  
COMMENTS





## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 3

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6582  
 CLIENT GSHF  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Don Longear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

BOLE DESIGNATION IW-2  
 DATE/TIME STARTED 4/7/11  
 DATE/TIME COMPLETED 4/9/11  
 DRILLING METHOD Sanic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										GRAIN SIZE		
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E S	S A M P L E T H I C K N E S S	PENETRATION RECORD SPLIT SPOON BLOW (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D (ppm)		C H E M I C A L A N A L Y S I S	
						6"	6"	6"	6"	N	R					
248		258	No Return													
258		273	tan brown medium sand, some fine sand + silt, loose											0.5		
273		280	dark gray silty clay, stiff											0.0		
280		298	tan brown fine sand + silt, some med sand, firm											1.2		
298		307	tan brown fine-medium sand, loose, some fine sand + silt											2.4		
307		328	dark gray/black silty clay, very st. ff											0.0		
328		336	dark gray/black silty clay, very st. ff											0.0		
336		348	light gray fine sand + silt, firm											1.2		
	348		end of boring													

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

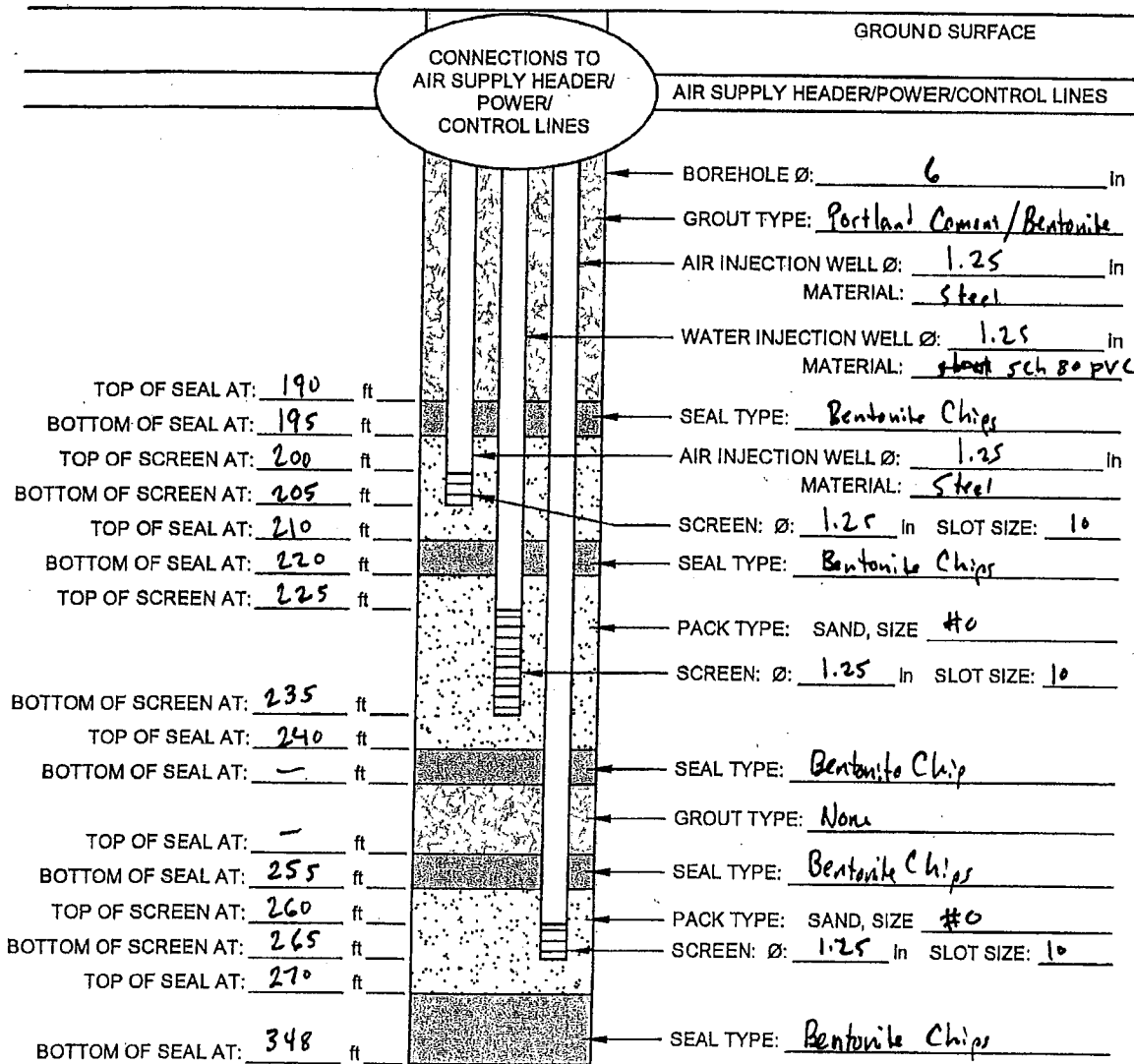
NOTES AND COMMENTS





# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooler Run HOLE DESIGNATION: IW-2  
 PROJECT No: 6883 DATE COMPLETED: 4/8/11  
 CLIENT: GSHI DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

WATER: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 348' 7" to 287'

DEVELOPMENT: METHOD: Air lift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 3

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6887  
 CLIENT GSH&  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION TW-3  
 DATE/TIME STARTED 3/22/11  
 DATE/TIME COMPLETED 3/29/11  
 DRILLING METHOD Hand  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E P E T H I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	F I D / F I D  (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	8"	8"	N	R					
0		37				tan brown medium coarse sand + gravel Some fine sand + silt, loose										
37		50	tan brown + light gray medium sand, loose 20 50'									0.0				
50		57	light brown medium sand, some fine sand + silt, loose									0.0				
57		70	light gray medium sand, loose									0.1				
70		73	light gray fine sand + silt, firm									0.0				
73		77	tan brown coarse sand, loose									0.0				
77		97	light gray fine-medium sand, loose									0.1				
97		117	light gray + light brown fine-medium sand + silt trace clay (sticky), firm, slight odor									0.2				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 2

PROJECT NAME Hooker Run  
 PROJECT NUMBER GE13  
 CLIENT GSHI  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boat Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION ILW-3  
 DATE/TIME STARTED 3/22/11  
 DATE/TIME COMPLETED 3/24/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L #	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R					
117		127	light gray medium sand, loose, slight odor									1.2				
127		147	light gray fine-medium sand + silt, clay lenses throughout, firm, slight odor									3.4				
147		167	tan brown + light gray fine-medium sand, loose, slight odor									0.7				
167		197	light gray medium sand, loose, slight odor									1.6				
197		207	light brown + light gray fine-medium sand, firm									0.0				
207		227	light brown fine sand + silt, firm, odor									0.0				
227		235	tan brown fine-medium sand, loose, some silt									5.4				
235		247	dark gray/black silty clay, stiff									0.0				
247		257	tan brown medium sand, some fine sand + silt, firm									1.6				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 3

PROJECT NAME Hboku- Rv10  
 PROJECT NUMBER G883  
 CLIENT GSHF  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bent Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-3  
 DATE/TIME STARTED 3/22/11  
 DATE/TIME COMPLETED 3/24/11  
 DRILLING METHOD SONIC  
 CRA SUPERVISOR S. Daly

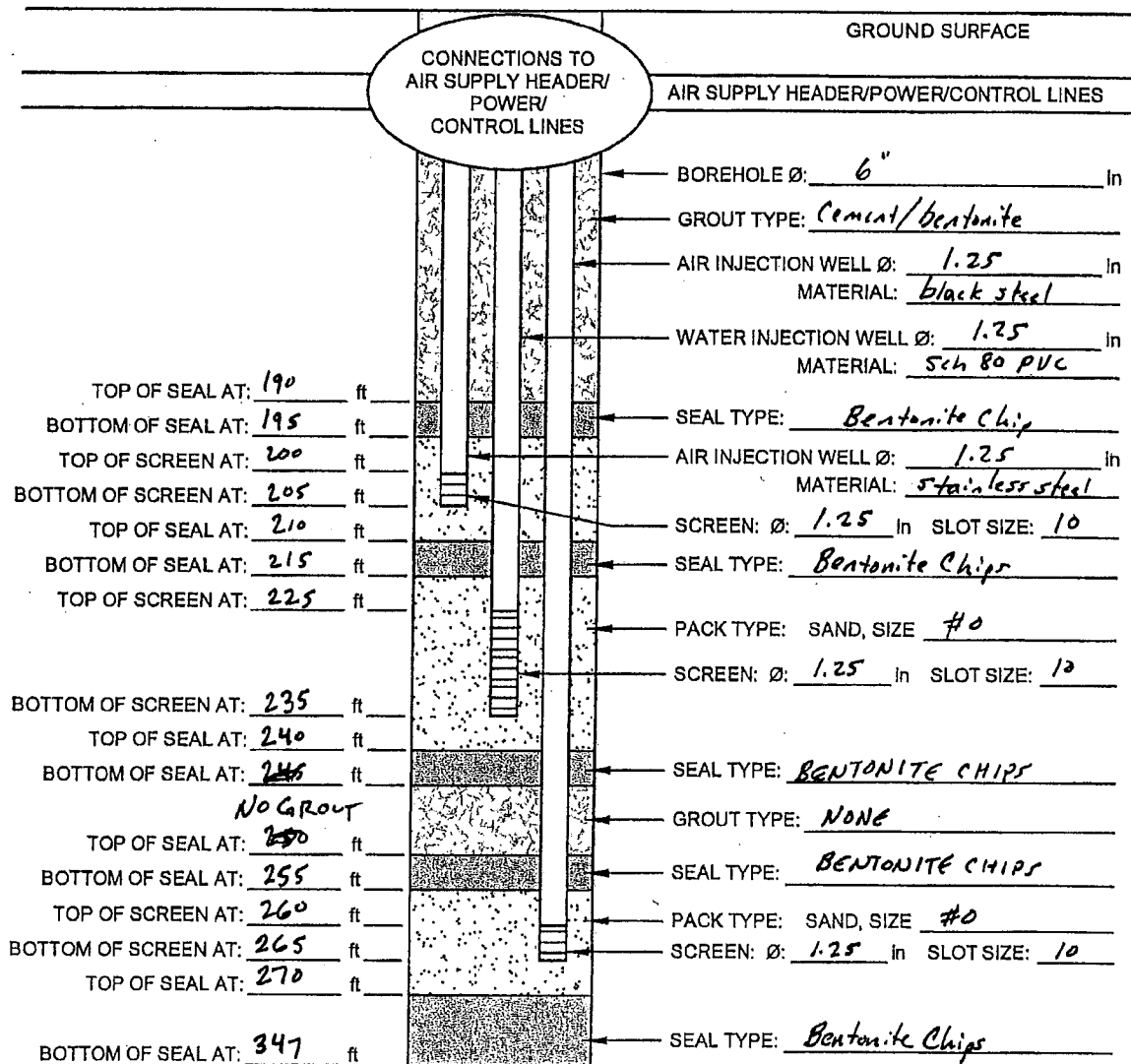
STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E L I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D F I D (ppm)	C H E M I C A L	G R A I N S I Z E
F R O M	A T	T O				6"	8"	8"	8"	N	R				
257		270				orange brown medium sand, loose									
270		277	light brown silty clay, stiff									0.0			
277		285	orange brown medium sand, loose									5.4			
285		297	light gray fine sand + silt, firm									1.6			
297		303	light brown/gray medium sand, loose									2.0			
303		328	dark gray/black silty clay, stiff									0.0			
328		342	light gray fine sand + silt, firm									2.3			
342		347	light gray fine-medium sand, loose									0.8			
	347		END OF BORING												
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL NOTES												



# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Road  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: IW-3  
 DATE COMPLETED: 3/25/11  
 DRILLING METHOD: sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

WATER: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347', 7" to 287'

DEVELOPMENT: METHOD: Air Lift

DURATION: 1, 25, 2 hr (5 I D (5 I D (250, 250, 750 gal))

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 4

PROJECT NAME Hicksville  
 PROJECT NUMBER 6883  
 CLIENT GSHE  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boett Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-4  
 DATE/TIME STARTED 1/17/11  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD Senic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N F O R M A T I O N	SAMPLE DETAILS						S I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)										
						6"	6"	6"	6"	N	R					
0		23	No LOG													
23		37	tan brown + dark brown medium-coarse sand + gravel, fines, (fill) loose									0.0				
37		48	SAME									0.0				
48		57	light brown fine-medium sand, loose									0.0				
57		70	light brown + light gray medium sand, loose									0.0				
70		77	light brown fine sand, firm, some silt									0.0				
77		87	light brown fine sand, some silt, firm									0.0				
87		97	light gray medium sand, loose									0.0				
97		105	tan brown + light gray medium sand, loose									0.5				
			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____													



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 4

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6833  
 CLIENT GS/II  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bect Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-4  
 DATE/TIME STARTED 1/17/11  
 DATE/TIME COMPLETED 1/20/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N D I C A T O R	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	8"	8"	8"	N	R					
105		117				light gray fine sand silt, clay lenses, firm										
117		137	light brown + light gray fine-medium sand loose, sweet odor									6.5				
137		157	light gray fine sand, some silt, firm, odor									2.5				
157		177	light brown + light gray medium sand, loose, some silt, odor									<del>3.0</del> 2.5				
177		197	light brown + light gray fine-medium sand slight odor, loose									3.1				
197		205	light brown + light gray medium sand, loose, odor									4.0				
205		207	tan brown fine sand silt, trace clay, firm, odor									3.5				
207		227	tan brown + light gray fine sand silt, some clay firm, slight odor									3.5				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_





## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 4

PROJECT NAME Hicksville Run  
 PROJECT NUMBER 6382  
 CLIENT GS NJ  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Beard Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-4  
 DATE/TIME STARTED 1/17/11  
 DATE/TIME COMPLETED 1/20/11  
 DRILLING METHOD Senic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L #	SAMPLE DETAILS						S I N T E R V A L #	P I D I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
P R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWE (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	8"	N	R				
227		242	tan brown + light gray fine sand + silt Some clay, firm, slight odor										5.6		
242		247	tan brown medium sand, loose, odor										52.3		
247		257	tan brown medium sand, loose, odor										38		
257		270	tan brown + light gray fine sand + silt, firm, odor										38.8		
270		277	tan brown medium sand, loose odor										21.2		
277		282	tan brown medium sand, loose, slight odor										15.8		
282		290	light gray silty clay, stiff, no odor										0.0		
290		297	tan brown fine-medium sand, clay layer 294-295 firm										2.5		
297		307	NO RECOVERY - BROKEN CORE BARREL										—		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_  
 WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_  
 COMPLETION DETAILS: \_\_\_\_\_  
 NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.  
 NOTES: \_\_\_\_\_



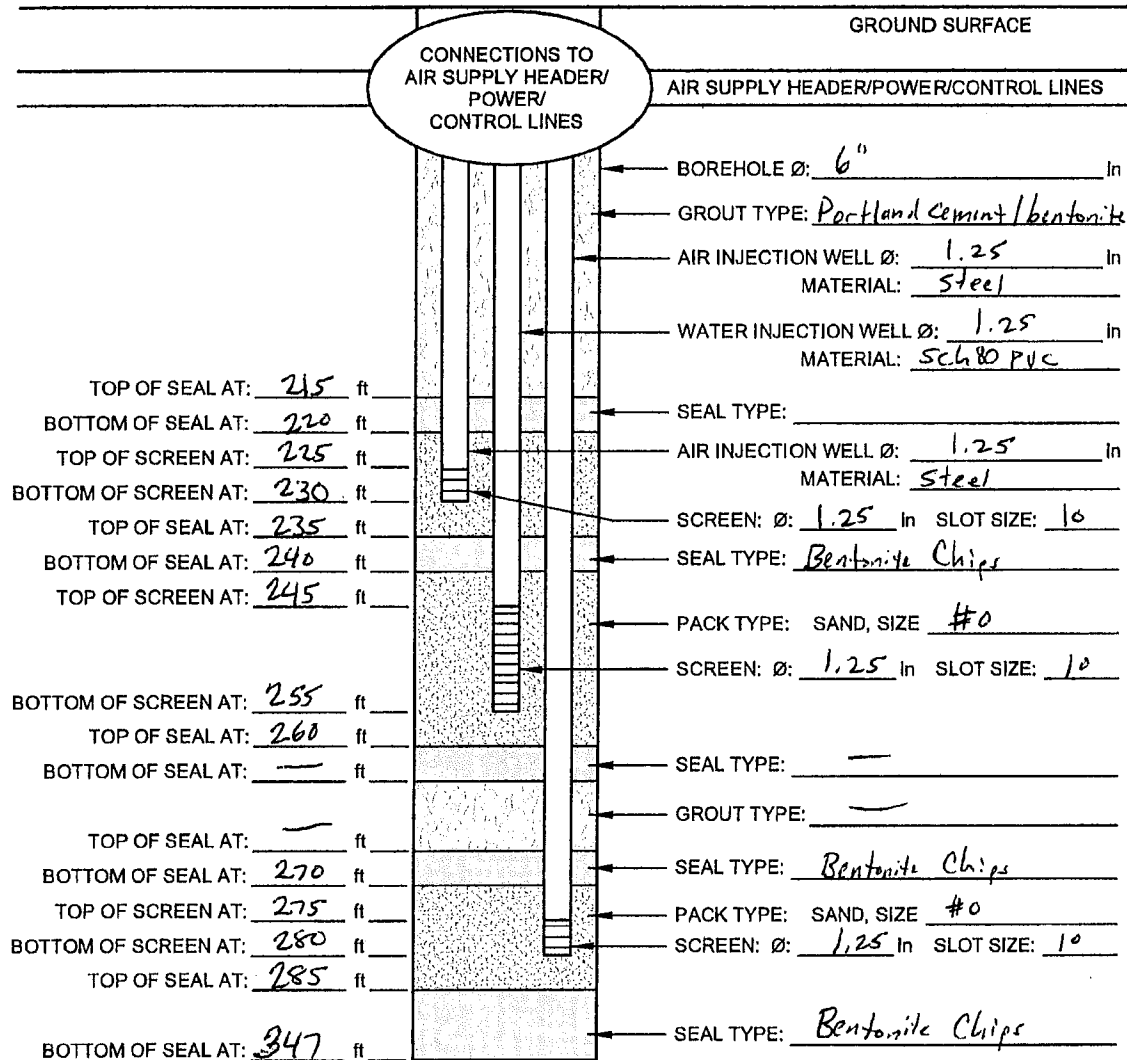
PAGE 4 OF 4

HOLE DESIGNATION IW-4  
DATE/TIME STARTED 1/17/11  
DATE/TIME COMPLETED 1/22/11  
DRILLING METHOD Sonic  
CRA SUPERVISOR S. Daly

[illegible]

# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ru. HOLE DESIGNATION: IW-4  
 PROJECT No: 6883 DATE COMPLETED: 1/27/11  
 CLIENT: GSHE DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ Plastic ☐ Other: \_\_\_\_\_  
 WATER: ☐ Stainless Steel ☒ Plastic ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6" to 347' 7" to 217'  
 DEVELOPMENT: METHOD: Air Lift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 4

PROJECT NAME Hunter-Rulo  
 PROJECT NUMBER 0283  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Best Longyear  
 DRILLER Mont  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION TL-5  
 DATE/TIME STARTED 4/11  
 DATE/TIME COMPLETED 4-11-01  
 DRILLING METHOD Auto Sonic  
 CRA SUPERVISOR Rob Redman

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E T H I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L	G R A I N S I Z E
F R O M	A T	T O				0"	6"	6"	6"	N	R				
0		18				Some Fill, Gravel, Asphalt, Buckchips, Res									
			Lt Brown Fine to med sand, to coarse gravel												
			Grading to over sand + fine well rounded gravel												
18		28	Lt Brown Fine to medium sand to fine to coarse									0.0			
			gravel, sub rounded, dry, loose									0.0			
28		37	Lt Brown medium sand, dry, loose									0.0			
	0.35		Thin blue gray clay seam												
37		40	Lt Brown very fine to fine sand trace silt, dry												
40		54	Lt Brown med sand, moist to wet, loose									0.0			
	PAGE														
54		57	Black Clay very stiff, plastic, moist to wet									0.0			
57		60	Lt Brown Fine to med sand, wet, loose									0.0			
60		68	Yellowish Brown medium to coarse sand, wet loose									0.0			
68		72	Yellowish Brown very coarse sand + fine									0.0			
			gravel, wet loose												
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____												
			WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____												
			COMPLETION DETAILS: _____												
			NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL												
			NOTES: _____												



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 of 4

PROJECT NAME Hicksville  
 PROJECT NUMBER 0883  
 CLIENT C&H  
 LOCATION Hicksville

DRILLING CONTRACTOR Boart Longyear  
 DRILLER 1190  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION 21-5  
 DATE/TIME STARTED 4-9-11  
 DATE/TIME COMPLETED 4-11-11  
 DRILLING METHOD Rotary Sonic  
 CRA SUPERVISOR Rob Redman

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										GRAIN SIZE	
FROM	TO	AT		ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	SAMPLE LENGTH	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						SAMPLE INTERVAL		P / F ID
							6"	6"	6"	6"	N	R		(ppm)	
72	77		Stratified Blue-gray silt to lt brown very fine sand. Thin layers of 1/8" to 1/4" thick silt to silt, with											0.0	
77	80		lt brown very fine sand + silt, with												
80	93		Yellowish medium to coarse sand, loose, wet											0.0	
93	95		lt brown medium to fine sand, loose, wet												
95	97		Stratified, laminar, blue-gray clayey, lt brown silt and very fine sand, silt to silt, with											0.0	
97	103		Stratified blue-gray clayey silt to very fine sand. Thin to 1/8" - 1/4" seams of red oxidized sand												
103	105		lt blue gray clay plastic, shell with											0.0	
105	105		Stratified blue gray clayey silt to very fine sand												
105	112		thin to 1/8" - 1/4" seams of red oxidized sand with												
112	120		lt blue gray clay plastic shell with											0.0	
120	123		Stratified blue gray clayey silt to very fine sand, with												
123	127		Brown fine to medium sand with silt (loose, wet)												
127	127		Stratified blue gray clayey silt to very fine sand with											0.0	

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTES AND COMMENTS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 4

PROJECT NAME Rock Run  
 PROJECT NUMBER 6883  
 CLIENT CH&T  
 LOCATION Hicksville

DRLING CONTRACTOR Scott Longyear  
 DRILLER mark  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

SOLE DESIGNATION JW-5  
 DATE/TIME STARTED 4-9-11  
 DATE/TIME COMPLETED 4-11-11  
 DRILLING METHOD Motor Sonic  
 CRA SUPERVISOR Rob Bodine

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION		SAMPLE DETAILS											
FROM	TO	DEPTH	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE NO	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						SAMPLE INTERVAL	FID	ANALYSIS	GRAIN SIZE		
					6"	6"	6"	6"	N	R		(ppm)				
147	147	147	lt Greyish very fine sand, ore Reddish oxidized layers possible calcification, low, wet													
147	167	167	lt Brown to Greyish Brown Very fine to med. sand with silt, ore Reddish oxidized layers wet													
167	187	187	lt Brown to Grey Brown to Red oxidized layers wet Fine to medium sand wet													
187	195	195	mix of very fine sand + Blue grey clay stratified/ laminar calc structure, soft, wet													
195	203	203	lt Brown Very fine to fine sand with silt, wet, low													
203	207	207	lt Brown Very fine sand + thin layers of silty clay wet													
207	212	212	lt Brown fine sand with silt, cat low													
212	217	217	Reddish Brown fine to medium sand + silt, wet										1.3			
217	227	227	Reddish Brown fine to medium sand + silt, low													
227	237	237	lt Brown fine to medium sand, low, wet										0.0			
237	241	241	Reddish Brown medium sand, low, wet													
241	247	247	lt Brown medium sand										2.4			
247	263	263	Stratified mix of very fine sand to medium sand + silty clay										18.7			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_

AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

TOPSOIL THICKNESS \_\_\_\_\_

NOTES AND COMMENTS



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 4 OF 4

PROJECT NAME Hoka-Rucci  
 PROJECT NUMBER 0883  
 CLIENT CHSE  
 LOCATION Hicksville

DRILLING CONTRACTOR Boat Longyear  
 DRILLER maill  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION TL-5  
 DATE/TIME STARTED 4-9-11  
 DATE/TIME COMPLETED 4-11-11  
 DRILLING METHOD Rotary  
 CRA SUPERVISOR Rob Reiman

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION		SAMPLE DETAILS										CHEMICALS	GRAIN SIZE
FROM	TO	AT	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	SAMPLE LT NO GD	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						SAMPLE INTERVAL	PID			
						6"	6"	6"	6"	N	R		(ppm)			
263	270		Reddish Brown Fine to medium sand													
270	274		Streaked very fine to medium sand + silt/clay mat, soft										1.5			
274	300		lt grey to reddish brown silt to very fine sand streaked													
300	307		lt reddish brown fine to medium sand, wet loose										10.9			
307	313		Streaked fine to medium silt/clay + very fine sand, wet, soft													
313	324		Black clay very stiff dry to moist													
324	327		lt brown silt clay to very fine sand, streaked, wet													
			reddish brown oxidized sand, medium to coarse													
327	348		lt brown to grayish brown fine to medium sand													
			with silt and reddish brown oxidized clay													
			(wet, loose)													
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____													
			WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER _____ HOURS _____													
NOTES AND COMMENTS			COMPLETION DETAILS: _____													
			NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.													

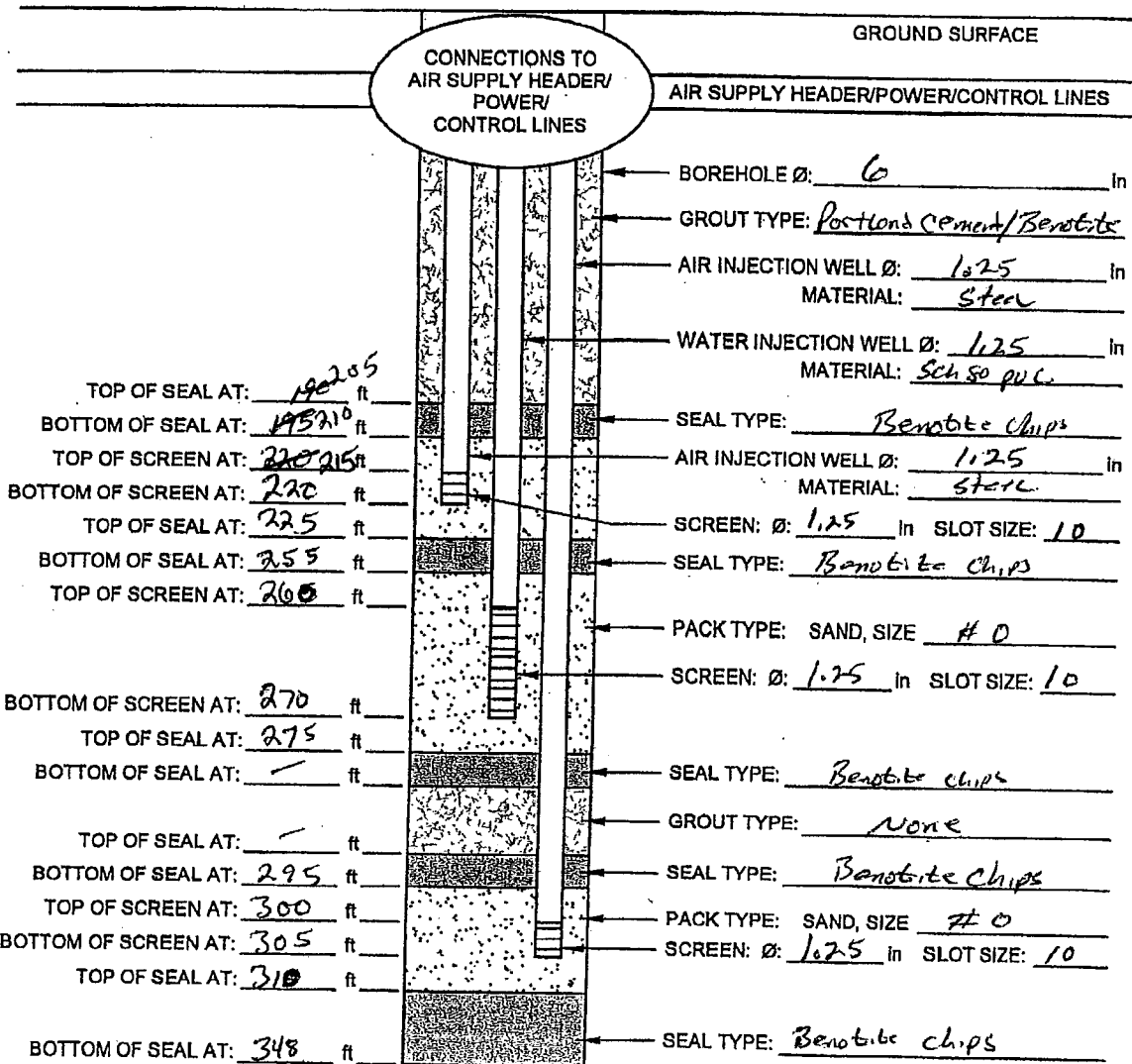




# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Harker-Ruco  
 PROJECT No: 6883  
 CLIENT: CSNI  
 LOCATION: Nicksunk, NY

HOLE DESIGNATION: FW-5  
 DATE COMPLETED: 4/12/11 6/15/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: R. Redman



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_  
 WATER: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6" to 348' 7" to 277'  
 DEVELOPMENT: METHOD: Air Lift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 1

PROJECT NAME Hicksville  
 PROJECT NUMBER 6383  
 CLIENT CSHE  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Robert Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION EW-6  
 DATE/TIME STARTED 7/11/11  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD Seneca  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R					
0		23	No recovered soil													
23		30	Orange-brown med-coarse sand + gravel, some fine sand + silt, cobbles									0.0				
30		37	light gray fine sand + silt, firm									0.0				
37		57	light gray fine sand + silt, firm									0.0				
57		77	tan brown + light gray medium sand, loose									0.0				
77		97	light gray fine sand, clay lenses 93-94'									0.0				
97		102	light brown fine sand + silt									0.0				
102		120	dark gray silty clay, very stiff									0.0				
120		131	tan brown fine med sand, loose, slight sweet odor									0.3				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



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Hicksville Biosparge

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p.3

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF

PROJECT NAME Hicksville  
 PROJECT NUMBER 6883  
 CLIENT CSHE  
 LOCATION Hicksville, NY

DILLING CONTRACTOR Boar & Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-6  
 DATE/TIME STARTED 1/11/11  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD Seneca  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E L I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D F I D (ppm)	C H E M I C A L	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
137		157	light gray fine sand, slight odor									1.0			
157		177	light gray fine-med sand, loose									0.3			
177		197	reddish brown med sand, loose, no odor									1.4			
197		227	tan brown fine-med sand, firm, no odor									0.7			
227		247	tan brown fine-med sand, some silt, loose slight odor									1.5			
247		257	tan brown fine-med sand, loose, no odor									1.2			
257		277	tan brown + reddish brown fine-med sand, loose no odor									23.7	at	265'	
												8.1	at	275'	
277		297	tan brown med sand, loose									17.7	at	285'	
												13.5	at	290'	

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_  
 WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_  
 COMPLETION DETAILS: \_\_\_\_\_  
 NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL  
 NOTES: \_\_\_\_\_

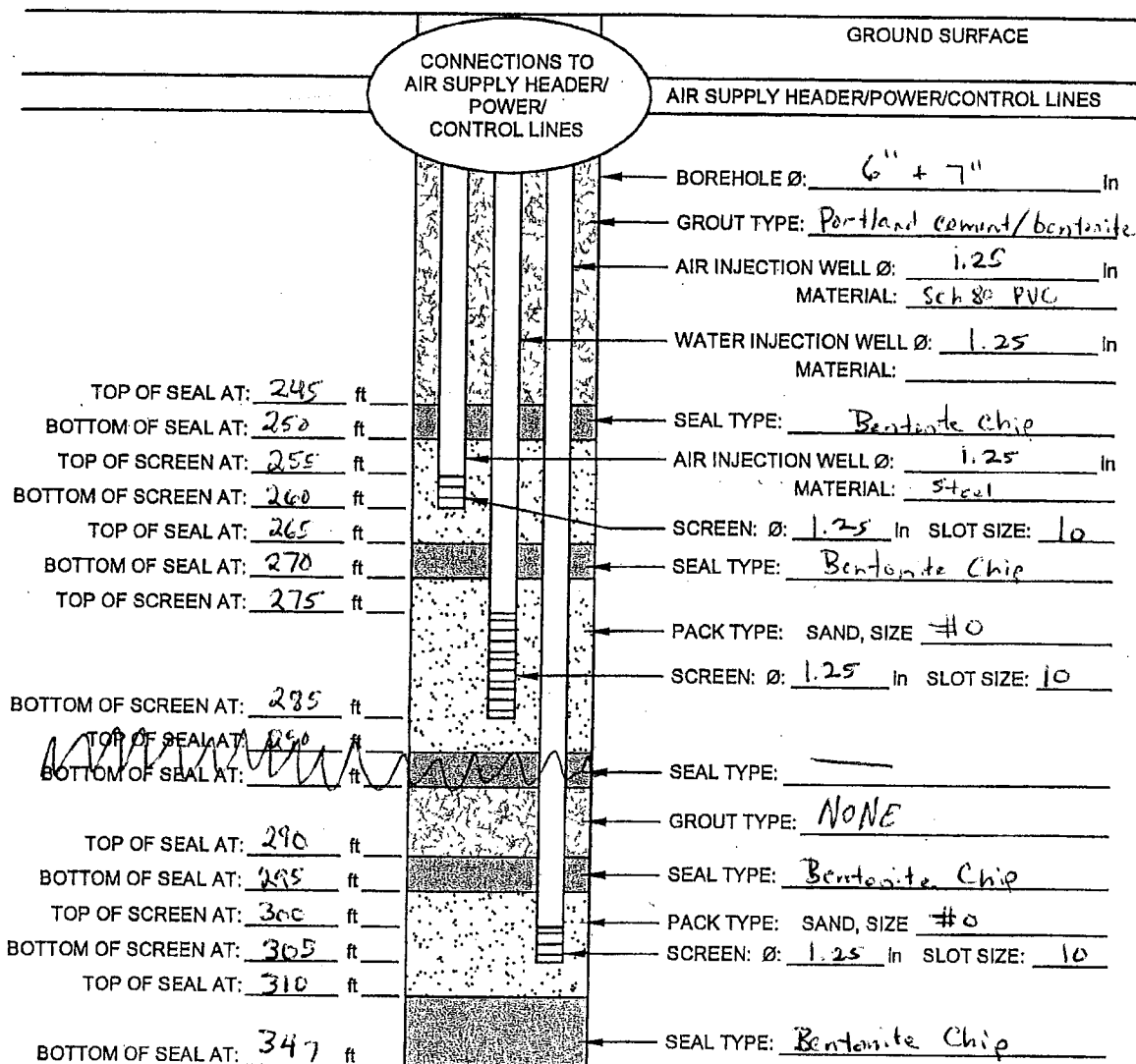




# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: IW-6  
 DATE COMPLETED: 1/17/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Dady



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: AIR: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_

WATER: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347' 7" to 217'

DEVELOPMENT: METHOD: Air lift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 3

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6883  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DILLING CONTRACTOR Boat Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-7  
 DATE/TIME STARTED 3/26/11  
 DATE/TIME COMPLETED 3/28/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E L E N G T H I N F T	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						0"	6"	6"	6"	N	R				
0		37	light brown medium-coarse sand & gravel, some fine sand + silt, loose										0.0		
37		50	light brown medium-coarse sand & gravel, some fine sand + silt										0.0		
50		57	~ 50' light brown fine sand + silt, firm										0.0		
57		77	light brown + light gray fine sand + silt, firm										0.0		
77		100	light gray fine sand + silt, firm										0.0		
100		114	dark gray/black silty clay, stiff										0.0		
114		117	tan brown fine-medium sand, loose										0.5		
117		127	light brown medium sand, some fine sand + silt, loose										0.0		
127		137	light gray medium sand, loose										0.5		
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____												



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 3

PROJECT NAME Hopke-Ruco  
 PROJECT NUMBER 6887  
 CLIENT GSIF  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Doet Langyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-7  
 DATE/TIME STARTED 3/26/11  
 DATE/TIME COMPLETED 3/28/11  
 DRILLING METHOD Rotary  
 CRA SUPERVISOR J. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE #	SAMPLING METHOD	SAMPLE DETAILS						SAMPLING INTERVAL	P / F ID (ppm)	CHEMICAL ANALYSIS	GRAIN SIZE
FROM	AT	TO				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
137		147	light gray medium sand, loose										0.7		
147		167	light gray + tan brown fine-medium sand, loose										1.4		
167		177	tan brown medium sand, loose										0.2		
177		187	tan brown medium sand, loose										0.4		
187		197	tan brown medium sand, loose										0.5		
197		217	tan brown fine-medium sand, some silt, firm										2.6		
217		227	tan brown fine-medium sand, some silt, firm										1.4		
227		242	tan brown fine-medium sand, some silt, firm										0.2		
242		247	light gray silty clay, stiff										0.0		
247		257	tan brown medium sand, loose, odor										1.7		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 3

PROJECT NAME Hooker Run  
PROJECT NUMBER 6683  
CLIENT GS12  
LOCATION Hicksville, NY

DRILLING CONTRACTOR Boat Longyear  
DRILLER \_\_\_\_\_  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-7  
DATE/TIME STARTED 3/26/11  
DATE/TIME COMPLETED 3/28/11  
DRILLING METHOD Sonic  
CRA SUPERVISOR J. Donly

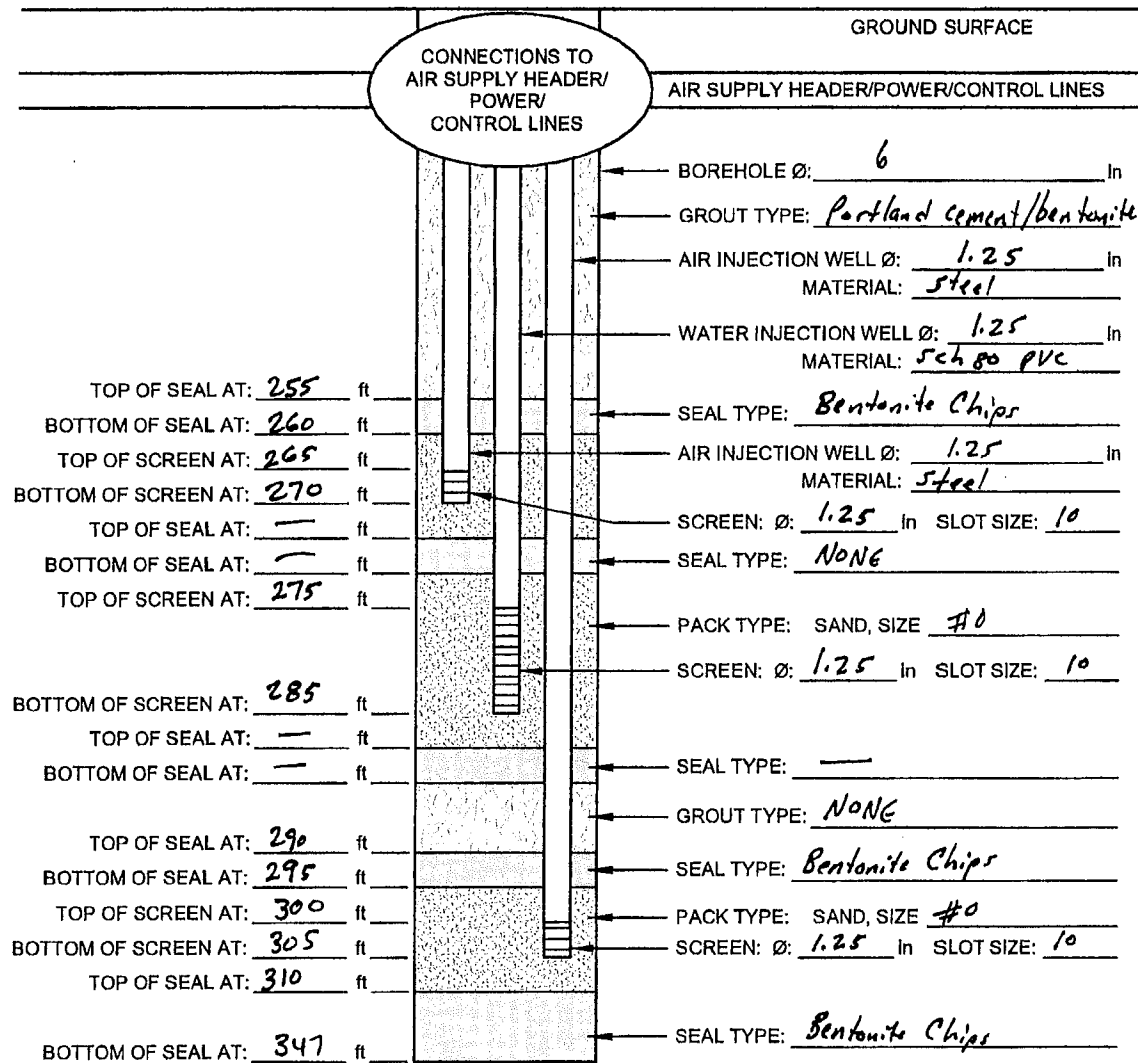
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# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruio  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: IW-7  
 DATE COMPLETED: 3/29/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ Plastic ☐ Other: \_\_\_\_\_  
 WATER: ☐ Stainless Steel ☒ Plastic ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6" to 347' 7" to 217'  
 DEVELOPMENT: METHOD: Sonic Air-lift DURATION: \_\_\_\_\_



# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 6

PROJECT NAME Hacker-Roco  
PROJECT NUMBER 0883  
CLIENT GSHE  
LOCATION Hicksville, NY

DRIILLING CONTRACTOR Berry Leary  
DRILLER Berry  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION HW-15  
DATE/TIME STARTED 7/21/10  
DATE/TIME COMPLETED \_\_\_\_\_  
DRILLING METHOD Soil  
GRA SUPERVISOR S. Doly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										GRAIN SIZE	ANALYSIS	CHEMICAL
FROM	TO	AT		SAMPLER TYPE	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						INTERVAL	P / I D (ppm)				
					6"	6"	6"	6"	N	R						
96	100		light gray fine sand, orange layers										0.0			
100	108		dark gray to black silty clay, very stiff										0.0			
108	113		light tan silty clay, stiff										0.0			
113	116		tan + gray fine sand, thin orange layers										0.0			
116	127		tan gray fine sand, thin orange layers										1.0			
127	129		light gray silty clay, stiff										0.0			
129	136		black/dark gray silty clay, very stiff										0.0			
136	142		SAME										0.0			
142	146		light gray fine sand + silt, trace clay										0.0			
146	153		dark gray/black silty clay, very stiff										0.0			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_

NOTES AND COMMENTS: \_\_\_\_\_



# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 6

PROJECT NAME Harker-Ruce  
PROJECT NUMBER 6883  
CLIENT CSRF  
LOCATION Hicksville, NY

DRIILLING CONTRACTOR Bart Longyear  
DRILLER Gerald  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-15  
DATE/TIME STARTED 9/21/10  
DATE/TIME COMPLETED \_\_\_\_\_  
DRILLING METHOD Sonic  
CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m FGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										ANALYSIS CHEMICAL	GRAIN SIZE
FROM M	TO F	T	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S I N T E R V A L	P I D F I D (ppm)		
						6"	6"	6"	6"	N	R				
153		156	tan brown + gray silty clay, st. ft											0.0	
156		176	tan brown medium sand, loose											3.1	
176		179	tan brown fine-medium sand, some silt											2.5	
179		181	light brown + light gray silt + fine sand											0.0	
181		196	tan brown medium sand, trace fine sand + silt											0.9	
196		217	light tan + gray fine sand w/ silt											0.7	
217		227	tan brown med sand w/ some fine sand + silt											0.5	
227		233	orange-brown medium-coarse sand											0.8	
233		237	tan clayey silt w/ orange brown mottles											0.0	
237		240	tan clayey silt w/ orange brown mottles											0.2	
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____												
			WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER _____ HOURS _____												
			COMPLETION DETAILS: _____												
			NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.												
			NOTES:												



SAMPLE GW-6883-092410-SD-001 collected from 30m'

STRATIGRAPHY LOG (OVERBURDEN)

PAGE 4 OF 6

PROJECT NAME Harker Ruco  
 PROJECT NUMBER 6883  
 CLIENT ASTI  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Beart Longyear  
 DRILLER Gerald  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

BHOLE DESIGNATION IW-15  
 DATE/TIME STARTED 9/21/16  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD Senic  
 CRA SUPERVISOR S. Dedy

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION		SAMPLE DETAILS										CHEMICALS	GRAIN SIZE
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						SAMPLE INTERVAL	P / I D (ppm)			
						6"	8"	6"	6"	N	R					
240		257	tan brown fine-med sand, thin light gray clay lenses											0.3		
257		270	tan brown fine-med sand + silt											0.0		
270		273	tan brown + gray silty clay, stiff											0.1		
273		277	dark gray/black silty clay, very stiff											0.0		
277		280	tan brown + gray silty clay, stiff											0.0		
280		297	tan brown fine-medium sand + silt											0.0		
297		305	light gray fine sand											0.0		
305		312	light gray fine sand + silt, orange mottles											0.0		
312		317	dark gray/black silty clay, very stiff											0.0		
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____													



SAMPLE GW-6883-092410-5D-C02 collected from 350'

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 5 OF 6  
IW-15

PROJECT NAME \_\_\_\_\_  
PROJECT NUMBER \_\_\_\_\_  
CLIENT \_\_\_\_\_  
LOCATION \_\_\_\_\_

DILLING CONTRACTOR \_\_\_\_\_  
DRILLER \_\_\_\_\_  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

ROLE DESIGNATION \_\_\_\_\_  
DATE/TIME STARTED \_\_\_\_\_  
DATE/TIME COMPLETED \_\_\_\_\_  
DILLING METHOD \_\_\_\_\_  
CRA SUPERVISOR \_\_\_\_\_

STRATIGRAPHIC INTERVALS (DEPTHS IN N/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS												CHEMICALS	GRAIN SIZE
FROM	TO	AT		ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	SAMPLE LT NO	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						SAMPLE INTERVAL	PID / FID			
						6"	6"	6"	6"	N	R		(ppm)				
317	322		light gray fine sand + silt w/ dark gray clay lenses										0.6				
322	337		light gray fine sand + silt										8.5				
337	347		SAME	001									6.2				
347	361		light gray fine sand + silt w/ trace clay	002									16.7				
361	378		light gray fine sand, orange mottles										12.7				
378	385		tan + gray fine sand										2.8				
385	394		light gray silty clay, stiff										1.2				
394	397		dark gray/black silty clay, very stiff										0.0				
397	399		light gray fine sand + silt										1.3				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES

Sep 27 10 08:13a

Hicksville Biosparce

1 (516) 822-1874

P.6



Sep 27 10 08:13a

1 (516) 822-1874

p. 7

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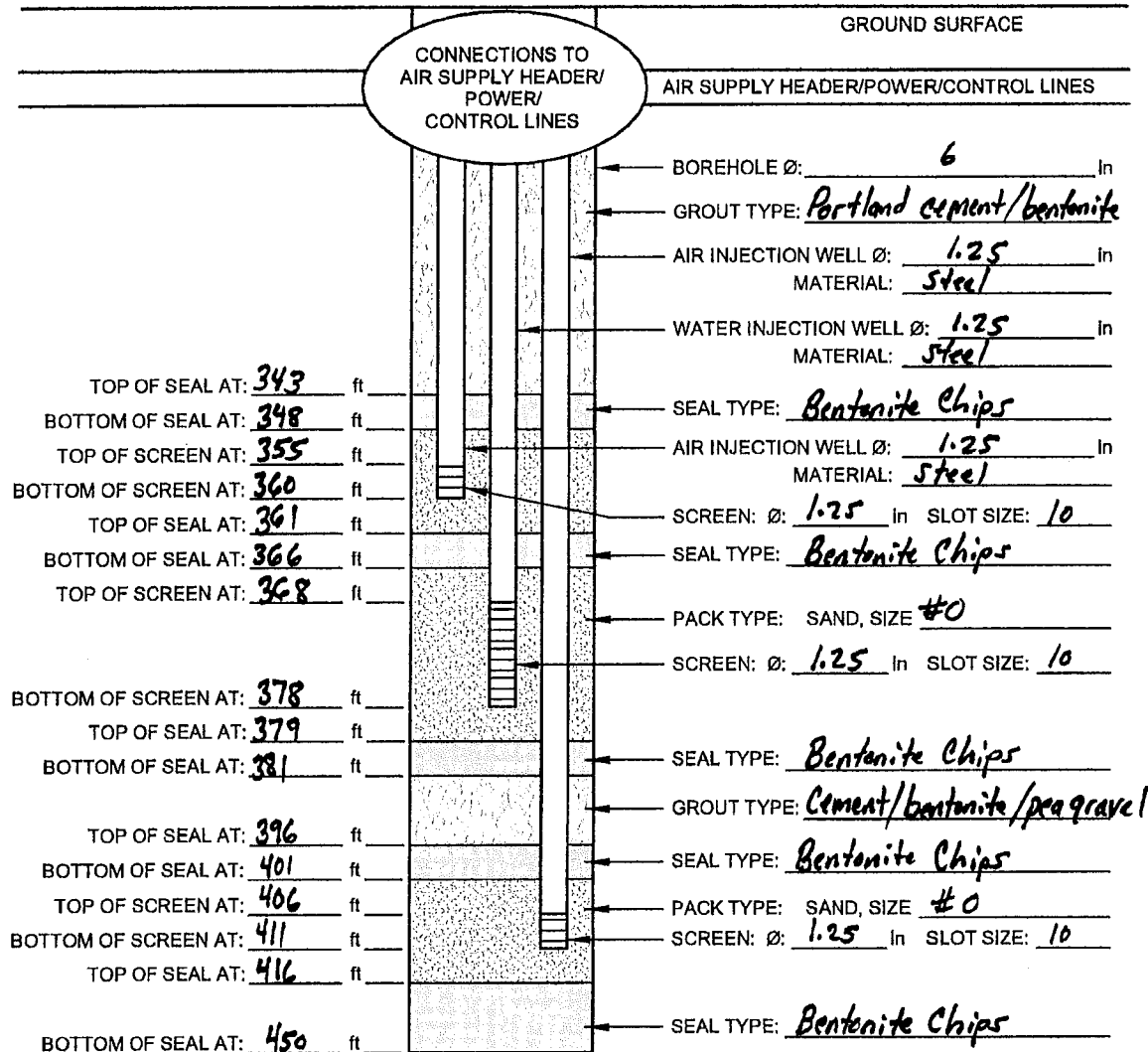
DRILLING CONTRACTOR Boat Longyear  
DRILLER Gerrid  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION TW-15  
DATE/TIME STARTED 9/2/10  
DATE/TIME COMPLETED 9/25/10  
DRILLING METHOD \_\_\_\_\_  
CRA SUPERVISOR S. Da/4

[illegible]

# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco HOLE DESIGNATION: IW-15  
 PROJECT No: 6883 DATE COMPLETED: 10/6/10  
 CLIENT: GSHF DRILLING METHOD: SONIC  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ Plastic ☐ Other: \_\_\_\_\_  
 WATER: ☒ Stainless Steel ☐ Plastic ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6" to 450' 7" to 300'  
 DEVELOPMENT: METHOD: Air Lift DURATION: \_\_\_\_\_





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-16

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
	GROUND SURFACE	121.58						
5	SILTY SAND, trace gravel, light brown, no odor		FLUSHMOUNT CASING WITH CONCRETE SEAL					0.0
10	SAND AND GRAVEL, medium to coarse sand, fine gravel, dry, light brown and red brown, no odor	115.58						0.0
15	SAND, trace silt, medium grained sand, light brown, moist, no odor	105.58						0.7
20			CEMENT/ BENTONITE GROUT					1.2
25	- trace gravel at 26.0ft BGS							0.0
30								0.6
35	CLAY, trace silt, stiff, dark brown	85.58	1"Ø SCH 40 STEEL RISER					0.0
40								0.0
45	SAND, fine grained, light brown, moist, no odor	75.58	1"Ø SCH 40 STEEL RISER					0.0
50								0.0
55	CLAY, high plasticity, dark gray, wet, no odor	65.58	1"Ø SCH 80 PVC RISER					0.0
60	SAND, medium grained, tan brown, moist, no odor	60.58						0.0
65	- fine to medium grained sand, wet at 66.0ft BGS							0.0
70								0.0
75	- light gray, clean, saturated at 76.0ft BGS							0.0
80								0.0
85								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-16

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
95	- gray at 96.0ft BGS							0.0
100								0.0
105	- trace coarse sand, gray and brown at 106.0ft BGS		CEMENT/ BENTONITE GROUT					0.0
110	- clay lens from 112.0 to 114.0ft BGS							0.0
115	- light brown, saturated at 116.0ft BGS							0.0
120			1" SCH 40 STEEL RISER					0.0
125	- medium grained sand, light brown and orangish brown at 126.0ft BGS							0.0
130								0.0
135	CLAY, stiff, dark gray, no odor	-14.44	1" SCH 40 STEEL RISER					0.0
140								0.0
145	- trace silt at 146.0ft BGS							0.0
150			1" SCH 80 PVC RISER					0.0
155	SAND, loose, fine to medium grained, light gray and orangish brown, no odor	-34.44						0.0
160								0.0
165	- light brown and light gray at 166.0ft BGS							0.0
170								0.0
175								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

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PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-16

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
185	- slight sweet odor at 186.0ft BGS							0.0
190								3.3
195	- light brown, sweet odor at 196.0ft BGS							
200			CEMENT/ BENTONITE GROUT					0.5
205	- light gray and orangish brown, thin clay lenses, no odor at 206.0ft BGS							
210								0.0
215	- loose, orange brown at 216.0ft BGS		1"Ø SCH 40 STEEL RISER					
220								0.0
225	- trace clay at 226.0ft BGS							
230	SILTY CLAY, light brown and gray	-108.44	1"Ø SCH 40 STEEL RISER					
235	- light gray at 236.0ft BGS							0.0
240								
245		-124.44	1"Ø SCH 80 PVC RISER					
250	SAND, trace silt and clay, stiff, fine to medium grained sand, low plasticity, slight sweet odor, light gray orangish brown							
255								0.0
260								
265	- tan brown, sweet odor at 266.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-16

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
275								4.3
	CLAY, light gray, no odor	-155.44						0.0
280	SAND, fine grained, light brown, orange mottles, no odor	-158.44						0.9
285	- medium grained sand, light brown, sweet odor at 286.0ft BGS							
290			CEMENT/ BENTONITE GROUT					0.0
295								
300	- loose, gray at 300.0ft BGS							
305			1"Ø SCH 40 STEEL RISER					3.2
310								
315	- tan brown, slight odor at 316.0ft BGS							
320			1"Ø SCH 40 STEEL RISER					0.2
325								
330								
335	- fine to medium grained sand, trace clay and silt, brownish gray, no odor at 336.0ft BGS		1"Ø SCH 80 PVC RISER					
340								3.1
345								
350	- loose, medium sand, gray, slight odor at 350.0ft BGS							14.8
355								
	CLAY, trace sand and silt, stiff, fine grained sand, dark gray	-235.44						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 8

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-16

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
365	SAND, loose, medium grained, tan brown	-244.44						0.0
370	CLAYEY SAND, trace silt, firm, light gray	-248.44						5.5
375								0.5
380		-256.44	BENTONITE CHIP SEAL					0.0
385	SAND AND SILT, fine grained sand, light gray - firm, sweet odor at 386.0ft BGS		#1 SILICA SAND					15.8
390			IW-16D1L SCH 80 PVC WELL SCREEN					
395			IW-16D1A STAINLESS STEEL WELL SCREEN					
400	SILTY CLAY, firm, light gray	-279.44	BENTONITE CHIP SEAL					0.0
405		-284.44						
410	SAND, fine to medium grained, light brown and light gray		1" SCH 40 STEEL RISER					0.3
415	- loose, medium grained, light brown, trace gray at 416.0ft BGS		CEMENT/ BENTONITE GROUT WITH 3/8" Ø PEA GRAVEL					15.8
420			BENTONITE CHIP SEAL					
425	- fine to medium grained, reddish brown, no odor at 425.0ft BGS		IW-16D2A STAINLESS STEEL WELL SCREEN					14.7
430			#1 SILICA SAND					
435								
440			BENTONITE CHIP SEAL					0.3
445	- light brown and gray at 445.0ft BGS							0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-16

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
455	END OF BOREHOLE @ 450.0ft BGS  STRATIGRAPHY OF IW-16 FROM MW-83	-328.44	<b>WELL DETAILS</b> Screened interval: -263.44 to -278.44ft AMSL 385.00 to 400.00ft BGS Length: 15ft Diameter: 1in Slot Size: 10 Material: SCH 80 PVC Seal: -253.44 to -258.44ft AMSL 375.00 to 380.00ft BGS Material: BENTONITE CHIPS Sand Pack: -258.44 to -279.44ft AMSL 380.00 to 401.00ft BGS Material: #1 SILICA SAND  Screened interval: -273.44 to -278.44ft AMSL 395.00 to 400.00ft BGS Length: 5ft Diameter: 1in Slot Size: 10 Material: STAINLESS STEEL Seal: -253.44 to -258.44ft AMSL 375.00 to 380.00ft BGS Material: BENTONITE CHIPS Sand Pack: -258.44 to -278.44ft AMSL 380.00 to 400.00ft BGS Material: #1 SILICA SAND  Screened interval: -303.44 to -308.44ft AMSL 425.00 to 430.00ft BGS Length: 5ft Diameter: 1in Slot Size: 10 Material: STAINLESS STEEL Seal: -293.44 to -298.44ft AMSL 415.00 to 420.00ft BGS Material: BENTONITE CHIPS Sand Pack: -298.44 to -313.44ft AMSL 420.00 to 435.00ft BGS Material: #1 SILICA SAND					
460								
465								
470								
475								
480								
485								
490								
495								
500								
505								
510								
515								
520								
525								
530								
535								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-17

DATE COMPLETED: November 30, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE	121.75						
5	SAND AND SILT, with gravel, loose, fine to medium grained sand, fine grained gravel, light brown, no odor			01				1.7
10								
15								
20								
25	CLAY, trace silt, firm, light brown SILTY CLAY, firm, light gray and dark gray	85.75 84.75		02				3.6
30								
35								0.2
40								0.0
45	SAND, loose, medium grained, tan brown	78.75		03				1.3
50								
55								0.9
60								0.4
65	SAND, loose, fine to medium grained, light brown	54.75		04				0.5
70								
75								
80								
85	- medium grained, trace fine grained sand at 77.0ft BGS			05				1.4

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-17

DATE COMPLETED: November 30, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N VALUE	PID (ppm)
95	- tan brown at 97.0ft BGS							
100								
105			CEMENT/ BENTONITE GROUT SEAL	06				2.6
110								
115	- trace silt at 117.0ft BGS							
120			1" Ø SCH 40 STEEL RISER					
125				07				1.1
130	- dark brown layer from 130.0 to 136.0ft BGS							
135			1" Ø SCH 40 STEEL RISER					
140	SILTY CLAY, stiff, dark gray	-15.25						
145				08				0.3
150			1" Ø SCH 80 PVC RISER					
155								
160	SAND, loose, fine to medium grained, light tan and light gray, slight sweet odor	-35.25						
165				09				4.1
170								
175	- tan brown and light gray, sweer odor at 177.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.


LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-17

DATE COMPLETED: November 30, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE					
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)	
185	- trace silt, trace clay, firm, fine grained, light brown, sweet odor at 197.0ft BGS			10				4.2	
190									
195									
200									
205	SAND AND SILT, trace clay, firm, fine grained sand, light brown, sweet odor	-95.25		11				3.8	
210									
215									
220									
225	CLAY, trace silt, stiff, dark gray	-115.25		12				5.1	
230									
235									
240									
245	SAND AND SILT, trace clay, firm, fine grained sand, tan brown	-126.25		13				0.7	
250									
255									
260									
265	SAND, loose, fine to medium grained, tan brown, sweet odor	-135.25		14				0.6	
								14.2	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-17

DATE COMPLETED: November 30, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
275	- trace silt, medium sand at 277.0ft BGS							
280								
285	- SILTY CLAY, light gray layer from 285.0 to 286.0ft BGS			15				23.8
290								
295	- medium grained, reddish brown at 297.0ft BGS							
300								6.8
305	- tan brown at 305.0ft BGS			16				10.2
310								
315	SAND AND SILT, fine grained sand, light gray							1.4
320	SILTY SAND, trace clay, firm, fine grained sand, light gray, orange mottles	-195.25						
325		-199.25						
330				17				2.5
335								
340	NO RECOVERY	-215.25						
345				18				N/A
350	SILTY CLAY, stiff, light gray, no odor	-228.25						
355				19				0.6
	SAND, firm, fine to medium grained, light gray, orange mottles	-235.25						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-17

DATE COMPLETED: November 30, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
365				20				
370	SILTY CLAY, firm, light gray	-248.25						
375								
380	SAND AND SILT, trace clay, firm, fine grained sand, light gray	-255.25						
385				21				2.3
390	SAND, trace silt, loose, fine to medium grained sand, light gray, sweet odor	-268.25						26.3
395	- light brown at 397.0ft BGS							
400								
405				22				2.9
410								
415	- trace fine grained sand, light gray at 417.0ft BGS							
420								5.8
425	- medium grained sand, tan brown at 428.0ft BGS			23				
430								9.5
435								
440	firm, fine to medium grained sand, reddish brown, no odor			24				4.2
445								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-17

DATE COMPLETED: November 30, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
	END OF BOREHOLE @ 450.0ft BGS	-328.25	<u>WELL DETAILS</u> Screened interval: -213.25 to -228.25ft AMSL 335.00 to 350.00ft BGS Length: 15ft Diameter: 1in Slot Size: 10 Material: SCH 80 PVC Seal: -203.25 to -208.25ft AMSL 325.00 to 330.00ft BGS Material: BENTONITE CHIPS Sand Pack: -208.25 to -228.25ft AMSL 330.00 to 350.00ft BGS Material: #1 SILICA SAND  Screened interval: -223.25 to -228.25ft AMSL 345.00 to 350.00ft BGS Length: 5ft Diameter: 1in Slot Size: 10 Material: STAINLESS STEEL Seal: -203.25 to -208.25ft AMSL 325.00 to 330.00ft BGS Material: BENTONITE CHIPS Sand Pack: -208.25 to -228.25ft AMSL 330.00 to 350.00ft BGS Material: #1 SILICA SAND  Screened interval: -298.25 to -303.25ft AMSL 420.00 to 425.00ft BGS Length: 5ft Diameter: 1in Slot Size: 10 Material: STAINLESS STEEL Seal: -288.25 to -293.25ft AMSL 410.00 to 415.00ft BGS Material: BENTONITE CHIPS Sand Pack: -293.25 to -307.75ft AMSL 415.00 to 429.50ft BGS Material: #1 SILICA SAND					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP. GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-18

DATE COMPLETED: January 6, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
	GROUND SURFACE	121.49						
5	TOPSOIL SAND AND GRAVEL, some silt, loose, fine to medium grained sand, orange-brown, no odor	121.32	FLUSHMOUNT CASING WITH CONCRETE SEAL					0.0
10								0
15								
20			CEMENT/BENTONITE GROUT					0
25								
30	SAND AND SILT, trace clay, firm, fine grained, light gray and orange	93.49						0
35			1" SCH 40 STEEL RISER					
40	- loose, tan brown, no odor at 38.0ft BGS							
45								
50			1" SCH 40 STEEL RISER					
55								
60	SAND, loose, medium grained, tan brown and grayish brown	63.49						0.1
65	SILTY CLAY, stiff, light gray - dark gray at 67.0ft BGS	56.49	1" SCH 80 PVC RISER					0
70								0
75								
80	SAND, loose, medium grained, tan brown - fine to medium grained sand, light tan, no odor at 78.0ft BGS	45.49						0.1
85								0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ, CRA, CORP. GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-18

DATE COMPLETED: January 6, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
95								
100								
105								0
110								
115								
120	- medium grained sand, tan brown at 118.0ft BGS							0.7
125	SILTY CLAY, compact, dark gray, no odor	-3.51						
130								0
135								
140	- stiff at 138.0ft BGS							
145								0
150								
155	SAND AND SILT, loose, fine to medium grained, light gray	-30.51						1.1
160								1.8
165	SAND, loose, fine to medium grained, tan brown	-42.51						
170								2.1
175								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-18

DATE COMPLETED: January 6, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
185								1.6
190	CLAY, trace silt, light brown	-68.51						0.3
195								
200	SAND AND SILT, trace clay, firm, fine grained, light brown	-76.51	CEMENT/ BENTONITE GROUT					3.1
205								
210	SAND, loose, fine to medium grained, light brown	-88.51						2
215	- tan brown at 218.0ft BGS		1"Ø SCH 40 STEEL RISER					
220								2.5
225								
230	SILTY CLAY, stiff, dark gray	-108.51	1"Ø SCH 40 STEEL RISER					0
235								
240	- no odor at 238.0ft BGS							0
245	SAND AND SILT, trace clay, firm, fine grained sand, tan brown and light gray	-124.51	1"Ø SCH 80 PVC RISER					0
250								
255								
260	SAND, loose, medium grained, tan brown, sweet odor	-138.51						
265								4.2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883 GP1 CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: IW-18

PROJECT NUMBER: 6883

DATE COMPLETED: January 6, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
275								
280								0.2
285	SAND AND SILT, firm, fine grained sand, light gray and orange, sweet odor	-163.51						
290			CEMENT/ BENTONITE GROUT					2.6
295	SAND, loose, fine grained, light gray, sweet odor	-173.51						2.7
300	- trace silt, firm, fine to medium grained sand, light gray, sweet odor at 300.0ft BGS							
305			1"Ø SCH 40 STEEL RISER					2.2
310								
315								
320	SAND AND SILT, firm, fine grained sand, gray, sweet odor	-196.51						
325			1"Ø SCH 40 STEEL RISER					
330								
335	SAND, loose, fine to medium grained, light gray, sweet odor	-212.51						12.2
340	- medium grained, tan brown, sweet odor at 338.0ft BGS		1"Ø SCH 80 PVC RISER					10.8
345			BENTONITE CHIP SEAL					13.4
350								42.6
355			#1 SILICA SAND IW-18D1L SCH 80 PVC					36.8

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: IW-18

PROJECT NUMBER: 6883

DATE COMPLETED: January 6, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
365	- clay lens from 363.0 to 364.0ft BGS	-244.51	WELL SCREEN IW-18D1A STAINLESS STEEL WELL SCREEN					15
370	- SAND AND SILT, trace clay, firm, fine grained sand, gray from 366.0 to 377.0ft BGS		BENTONITE CHIP SEAL					0
375	- no odor at 372.0ft BGS							0
380	SAND, loose, medium grained, tan brown, sweet odor		1" SCH 40 STEEL RISER					
390			CEMENT/ BENTONITE GROUT WITH 3/8" Ø PEA GRAVEL					5.4
400	- fine to medium grained, light gray, no odor at 400.0ft BGS							
410	- medium grained, light tan at 413.0ft BGS		BENTONITE CHIP SEAL					2
420								0.8
425	- medium to coarse grained, orange brown at 424.0ft BGS		IW-18D2A STAINLESS STEEL WELL SCREEN					1.8
430	SAND AND SILT, firm, fine to medium grained, light brown and gray	-307.51	#1 SILICA SAND					4.1
440	SAND, loose, medium grained, light reddish-brown, no odor	-316.51	BENTONITE CHIP SEAL					3.3

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/20/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: IW-18

PROJECT NUMBER: 6883

DATE COMPLETED: January 6, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
	END OF BOREHOLE @ 450.0ft BGS	-328.51	<u>WELL DETAILS</u> Screened Interval: -228.34 to -243.34ft AMSL 349.83 to 364.83ft BGS Length: 15ft Diameter: 1in Slot Size: 10 Material: SCH 80 PVC Seal: -218.51 to -223.26ft AMSL 340.00 to 344.75ft BGS Material: BENTONITE CHIPS Sand Pack: -223.26 to -245.51ft AMSL 344.75 to 367.00ft BGS Material: #1 SILICA SAND  Screened Interval: -238.34 to -243.34ft AMSL 359.83 to 364.83ft BGS Length: 5ft Diameter: 1in Slot Size: 10 Material: STAINLESS STEEL Seal: -218.51 to -223.26ft AMSL 340.00 to 344.75ft BGS Material: BENTONITE CHIPS Sand Pack: -223.26 to -245.51ft AMSL 344.75 to 367.00ft BGS Material: #1 SILICA SAND  Screened interval: -298.51 to -303.51ft AMSL 420.00 to 425.00ft BGS Length: 5ft Diameter: 1in Slot Size: 10 Material: STAINLESS STEEL Seal: -284.51 to -290.51ft AMSL 406.00 to 412.00ft BGS Material: BENTONITE CHIPS Sand Pack: -290.51 to -308.51ft AMSL 412.00 to 430.00ft BGS Material: #1 SILICA SAND					
455								
460								
465								
470								
475								
480								
485								
490								
495								
500								
505								
510								
515								
520								
525								
530								
535								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/20/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: IW-19

PROJECT NUMBER: 6883

DATE COMPLETED: January 11, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE	121.09						
5		115.09	FLUSHMOUNT CASING WITH CONCRETE SEAL					
10	SAND AND GRAVEL, trace silt, loose, fine to medium grained sand, orange-brown, no odor, stones to 0.5" diameter,			01				0.0
15	- medium to coarse grained sand, orange-brown, cobbles to 1" diameter at 16.0ft BGS							
20			CEMENT/ BENTONITE GROUT SEAL					0.0
25				02				
30	SAND, firm, medium grained, orange, no odor	91.09						0.0
35		85.09	1" Ø SCH 40 STEEL RISER					2.3
40	SAND AND SILT, loose, fine to medium grained sand, orange brown, no odor							
45	SILT AND CLAY, firm, light gray, no odor	76.09		03				0.0
	SAND AND SILT, firm, fine grained sand, light gray	75.09						2.1
50			1" Ø SCH 40 STEEL RISER					0.0
55	CLAY, some silt, firm, light gray	67.09						0.0
	- trace silt, light gray to dark gray at 56.0ft BGS							
60								0.0
65			1" Ø SCH 80 PVC RISER	04				
70	SAND, loose, medium grained, light tan and orange	53.09						0.4
75	- trace silt, light tan at 76.0ft BGS							0.0
80								
85	- light gray at 84.0ft BGS			05				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-19

DATE COMPLETED: January 11, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
95	- trace fine grained sand from 96.0 to 116.0ft BGS							0.0
100								
105			CEMENT/ BENTONITE GROUT SEAL	06				2.7
110								
115	- light brown at 116.0ft BGS							
120			1" Ø SCH 40 STEEL RISER					0.1
125	- trace silt, compact, dark gray at 125.0ft BGS			07				0.1
130	- firm, light gray at 129.0ft BGS							0.5
135			1" Ø SCH 40 STEEL RISER					
140	- loose, light gray and dark gray at 136.0ft BGS							
145				08				2.2
150			1" Ø SCH 80 PVC RISER					
155	- fine to medium grained sand, light gray at 156.0ft BGS							
160								
165				09				1
170								
175								1.2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-19

DATE COMPLETED: January 11, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
185	CLAY, stiff, dark gray	-60.91		10				0.0
190								
195								0.0
200	SAND, fine to medium grained, light gray	-78.91						0.6
205	SILTY CLAY, soft, light brown	-83.91		11				0.8
210								
215	SAND, trace silt, firm, fine to medium grained sand, tan brown	-94.91						3.6
220								
225				12				
230	CLAY, with silt, firm to stiff, tan brown to dark gray	-108.91						0.6
235	SILTY CLAY, stiff, dark gray	-114.91						0.9
240								
245	SAND, firm, fine grained, light gray and orange, no odor	-125.91		13				1.1
250								
255	- trace silt, loose, medium grained sand, trace fine grained sand, light brown and light gray at 256.0ft BGS							0.6
260								
265				14				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: IW-19

PROJECT NUMBER: 6883

DATE COMPLETED: January 11, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
275	- loose, medium grained sand, reddish brown at 274.0ft BGS - light brown at 276.0ft BGS							0.8
280								
285				15				2.9
290								
295								
300								
305				16				4
310								
315	- clay lens, light gray from 314.0 to 315.0ft BGS - with silt, loose, fine to medium grained, light gray at 316.0ft BGS							
320								3.3
325	CLAY, stiff, dark gray	-203.91		17				1.3
330								
335	SAND AND SILT, fine grained sand, orange-brown and gray - SAND, medium grained sand, light gray and light pink, sweet odor at 336.0ft BGS	-212.91 -214.91						2.3
340				18				10.8
345								
350	loose, trace fine grained sand, trace silt, tan brown							
355				19				12.3

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: IW-19

DATE COMPLETED: January 11, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
365	SILTY CLAY, stiff, light gray	-241.91	STEEL WELL SCREEN BENTONITE CHIP SEAL	20				0.2
	SAND AND SILT, loose, fine to medium grained sand, tan brown	-243.91						24.6
370	- trace clay, firm, fine grained sand, light gray at 370.0ft BGS							
375								2.5
380	SAND, loose, medium grained sand, light reddish brown	-258.91						5.1
385	- trace fine grained sand at 385.0ft BGS							12.9
390				21				35.6
395	- light gray, sweet odor at 393.0ft BGS							
400	- with silt, with fine grained sand, loose, light brown at 400.0ft BGS		1" Ø SCH 40 STEEL RISER					20.5
405				22				
410			BENTONITE CHIP SEAL					
415		-295.91						
420	NO RECOVERY		IW-19D2A STAINLESS STEEL WELL SCREEN	23				N/A
425								
430								
435		-315.91						
440	SAND, loose, fine to medium grained sand, reddish brown, no odor		BENTONITE CHIP SEAL	24				11.2
445								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: IW-19

PROJECT NUMBER: 6883

DATE COMPLETED: January 11, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	INJECTION WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	P/D (ppm)
	END OF BOREHOLE @ 450.0ft BGS	-328.91	<u>WELL DETAILS</u> Screened interval: -223.91 to -238.91ft AMSL 345.00 to 360.00ft BGS Length: 15ft Diameter: 1in Slot Size: 10 Material: SCH 80 PVC Seal: -206.91 to -215.91ft AMSL 328.00 to 337.00ft BGS Material: BENTONITE CHIPS Sand Pack: -215.91 to -239.41ft AMSL 337.00 to 360.50ft BGS Material: #1 SILICA SAND  Screened interval: -233.91 to -238.91ft AMSL 355.00 to 360.00ft BGS Length: 5ft Diameter: 1in Slot Size: 10 Material: STAINLESS STEEL Seal: -206.91 to -215.91ft AMSL 328.00 to 337.00ft BGS Material: BENTONITE CHIPS Sand Pack: -215.91 to -239.41ft AMSL 337.00 to 360.50ft BGS Material: #1 SILICA SAND  Screened interval: -298.91 to -303.91ft AMSL 420.00 to 425.00ft BGS Length: 5ft Diameter: 1in Slot Size: 10 Material: STAINLESS STEEL Seal: -288.91 to -293.91ft AMSL 410.00 to 415.00ft BGS Material: BENTONITE CHIPS Sand Pack: -293.91 to -308.91ft AMSL 415.00 to 430.00ft BGS Material: #1 SILICA SAND					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 6

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6993  
 CLIENT GSHT  
 LOCATION Hicksville Ny

DRILLING CONTRACTOR Bart Longyear  
 DRILLER Gerald Sealy  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-20  
 DATE/TIME STARTED 10/7/10  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)										
						6"	6"	6"	6"	N	R					
0		17	tan brown medium-coarse sand + gravel silt, dry										0.2			
17		37	tan brown med-coarse sand + gravel with silt - orange mottles										0.0			
37		50	reddish brown medium sand w/ fine sand + silt										0.0			
50			WATER TABLE													
50		57	light gray fine-medium sand + silt										0.0			
57		77	light gray fine-medium sand + silt 76-77 light gray silty clay, St.R										0.2 0.0			
77		84	tan brown fine-medium sand										0.1			
84		90	light gray silty clay, St.R										0.0			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_

NOTES AND COMMENTS



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 6

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6883  
 CLIENT GSHZ  
 LOCATION Hicksville NY

DILLING CONTRACTOR Boert Longyear  
 DRILLER Gerald Sealy  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-20  
 DATE/TIME STARTED 10/10  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD rot. Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L #	SAMPLE DETAILS						S I N T E R V A L #	P I D I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
90		94	light gray fine sand									0.2			
94		97	light gray silty clay, stiff									0.0			
97		117	light gray fine-medium sand									0.3			
117		122	light gray fine-medium sand									0.0			
122		125	tan brown fine-medium sand, some silt									0.1			
125		137	light gray fine-medium sand									0.1			
137		150	light gray fine-medium sand									0.0			
150		152	tan brown fine-medium sand + silt									0.1			
152		157	light gray fine-medium sand									0.0			
157		177	light gray fine-medium sand									0.2			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_





## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 4 OF 6

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6883  
 CLIENT GSI  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
 DRILLER Gerald Sealy  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-2c  
 DATE/TIME STARTED 10/7/10  
 DATE/TIME COMPLETED 10/10/10  
 DRILLING METHOD Sanic  
 CRA SUPERVISOR S. Duly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft./to BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E T H I C K N E S S	SAMPLE DETAILS						S I N T E R V A L	F I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E	
F R O M	A T	T O				ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
							0"	6"	6"	6"	N					R
237		257	light gray to tan brown fine sand + silt thin clay lenses throughout										0.0			
257		277	light gray + tan brown marbled fine sand + silt										0.1			
277		297	tan brown medium sand, loose										0.4			
297		304	tan brown medium sand, loose										3.3			
304		308	light gray silty clay, stiff										2.1			
308		318	orange brown medium sand, loose, sweet odor										6.6			
318		325	light gray fine sand + silt, odor										7.5			
325		338	light gray reddish brown fine sand + silt sweet odor										5.8			
338		348	tan brown medium sand, loose										1.5			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_

NOTES AND COMMENTS



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 5 OF 6

PROJECT NAME Harker Run  
 PROJECT NUMBER 6883  
 CLIENT GSHT  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Robert Longyear  
 DRILLER Gerald Sealy  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-20  
 DATE/TIME STARTED 10/7/10  
 DATE/TIME COMPLETED 10/12/10  
 DRILLING METHOD Swiss  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS												
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E	I N T E R V A L	P I D I D	C H E M I C A L	G R A I N S I Z E
						6"	6"	6"	6"	N	R			(ppm)		
348		358	tan brown medium sand, loose											0.9		
358		368	tan brown to light gray fine-medium sand											1.3		
368		373	tan brown + light gray fine-medium sand											3.5		
373		377	light gray silty clay, stiff											2.0		
377		388	light gray fine sand & silt, orange mottles slight odor											11.6		
388		398	light gray fine sand & silt, slight odor											8.6		
398		407	reddish brown medium sand, loose, sweet odor											11.7		
410		414	light gray silty clay, stiff											0.0		
414		417	reddish brown medium sand, loose											3.7		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES: \_\_\_\_\_

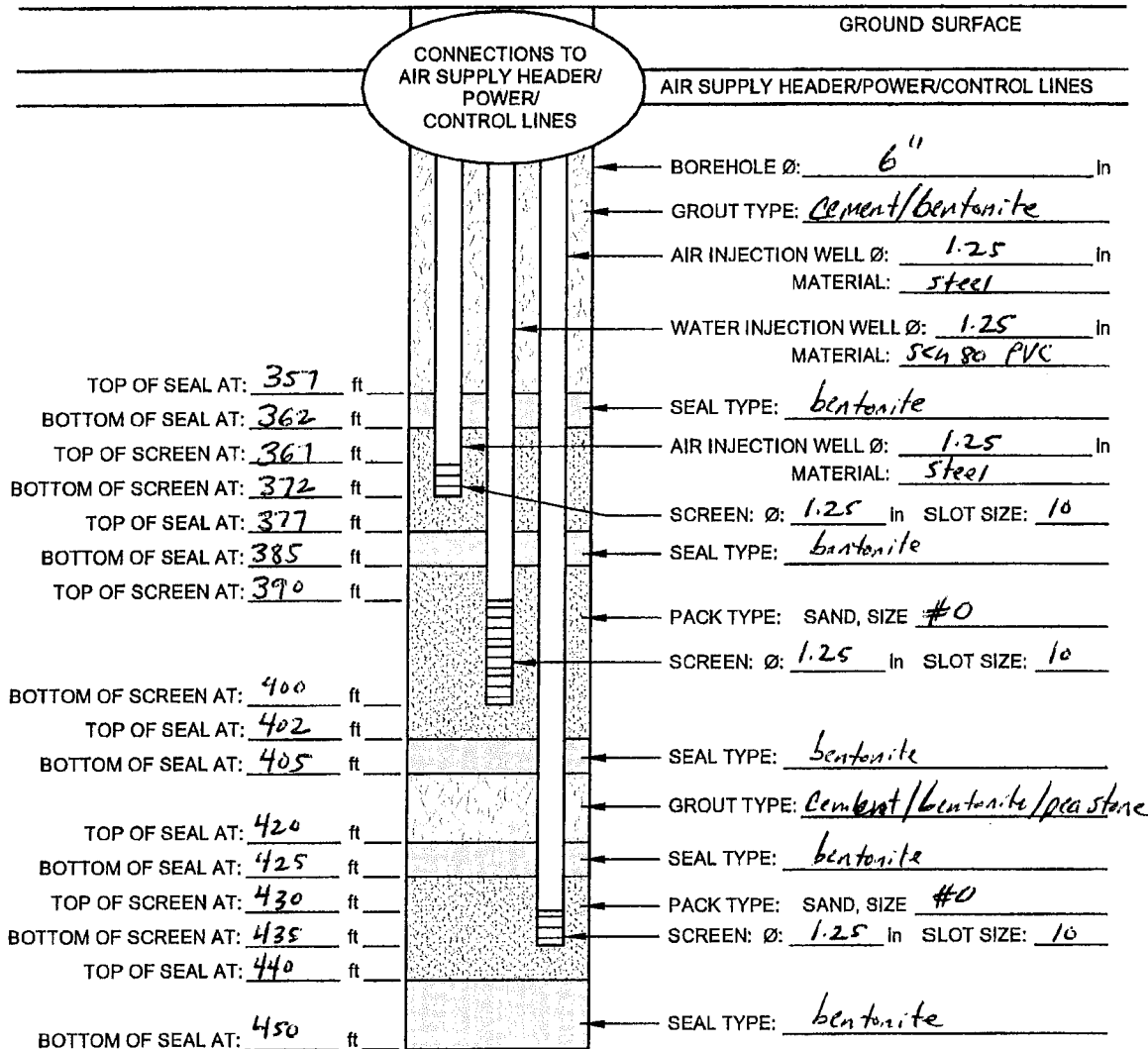
NOTES  
AND  
COMMENTS





# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco HOLE DESIGNATION: IW-20  
 PROJECT No: 6883 DATE COMPLETED: 10/13/10  
 CLIENT: GSHF DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 WATER: ☐ Continuous Slot ☒ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ Plastic ☐ Other: \_\_\_\_\_  
 WATER: ☐ Stainless Steel ☒ Plastic ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6" to 450', 7" to 290', 8" to 20'  
 DEVELOPMENT: METHOD: Air lift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 6

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 10883  
 CLIENT GSHF  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bhart Luyken  
 DRILLER Charles Sealy  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-21  
 DATE/TIME STARTED 10/14/10  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD 50m.c  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION		SAMPLE DETAILS												GRAIN SIZE
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	SAMPLE LENGTH IN G.D.	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						SAMPLE INTERVAL	P / F ID	CHEMICALS			
						6"	6"	6"	6"	N	R		(ppm)				
0		17	tan brown med-coarse sand & gravel some silt, loose										0.0				
17		37	tan brown med-coarse sand & gravel trace silt, loose										0.0				
37		47	dark gray/black silty clay, stiff										0.0				
47		54	tan brown fine sand, loose w/ gray mottler										0.0				
	54		water table														
54		57	light gray fine sand w/ tan/brown marbled areas										0.0				
57		<del>70</del> 65	tan brown medium sand, loose, trace silt										0.0				
65		77	light gray medium sand, loose, trace silt										0.0				
77		82	tan brown medium sand, loose										0.0				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_





## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 6

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6883  
 CLIENT GSH  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
 DRILLER G. Sealey  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-21  
 DATE/TIME STARTED 10/14/10  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	8"	6"	6"	N	R				
82		90	light gray silty clay, stiff, w/ several light brown sandy layers										0.0		
90		97	light gray fine sand + silt										0.0		
97		117	light gray fine sand, loose, trace silt light gray clay lenses @ 99-104, 104-105, 111-112										0.0		
117		137	light gray fine sand, trace silt										0.0		
124		135	light gray silty clay, stiff										0.0		
135		137	light gray fine sand, loose										0.2		
137		157	light gray fine-medium sand, some silt, loose										0.0		
157		177	light gray fine sand + silt w/ a light brown clay layer at 166-173										0.0		

NOTES  
AND  
COMMENTS

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES:



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 6

PROJECT NAME Hacker Ruco  
 PROJECT NUMBER 6893  
 CLIENT GSIF  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boat Longyear  
 DRILLER Gerald Sealy  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION ILW-21  
 DATE/TIME STARTED 10/14/10  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE #	SAMPLER TYPE	SAMPLE DETAILS						SAMPLER TYPE	P / ID	CHEMICALS	GRAIN SIZE
FROM	AT	TO				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	8"	8"	8"	N	R				
177		197	light gray fine sand, some silt, firm									0.0			
197		204	light gray to tan brown fine sand to silt, firm									0.0			
204		210	tan brown silty clay, stiff									0.0			
210		225	dark gray/black silty clay, very stiff									0.0			
225		237	tan brown fine sand to silt, firm									0.0			
237		250	orange brown fine-medium sand to silt, loose									0.2			
250		257	dark gray/black silty clay, very stiff									0.0			
257		268	orange-brown medium sand, loose									0.2			
268		278	light gray fine sand to silt, firm									0.1			
278		285	tan brown fine-medium sand, loose, sweet odor									1.7			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_

NOTES AND COMMENTS



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 4 of 6

PROJECT NAME Hicksville  
 PROJECT NUMBER 6587  
 CLIENT CSH  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Baart Longyear  
 DRILLER Gerald Sealy  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW 21  
 DATE/TIME STARTED 10/14/10  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD Sanic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/in BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS											GRAIN SIZE	
F R O M	A T	T O		S A M P L E #	S A M P L E L T H I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORDED N-VALUES & RECOVERIES)						S I N T E R P L E	P I D I D (ppm)	C H E M I C A L		
						6"	6"	6"	6"	N	R					
285		288	light gray silty clay, stiff											0.0		
288		292	dark gray/black silty clay, very stiff											0.0		
292		297	light gray + orange brown fine sand + silt, sweet odor											1.2		
298		308	tan brown medium sand, loose, odor											1.6		
308		318	tan brown medium sand, loose, odor											1.3		
318		328	reddish brown and light gray fine sand + silt, odor											0.5		
328		347	reddish brown fine-medium sand + silt, loose, odor											3.1		
347		357	tan brown medium sand, some fine sand + silt, odor											7.9		
357		360	tan brown medium sand, some fine sand + silt, odor											4.1		
360		368	light gray fine sand w/ thin clay lenses throughout											2.8		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_





PAGE 6 OF 6

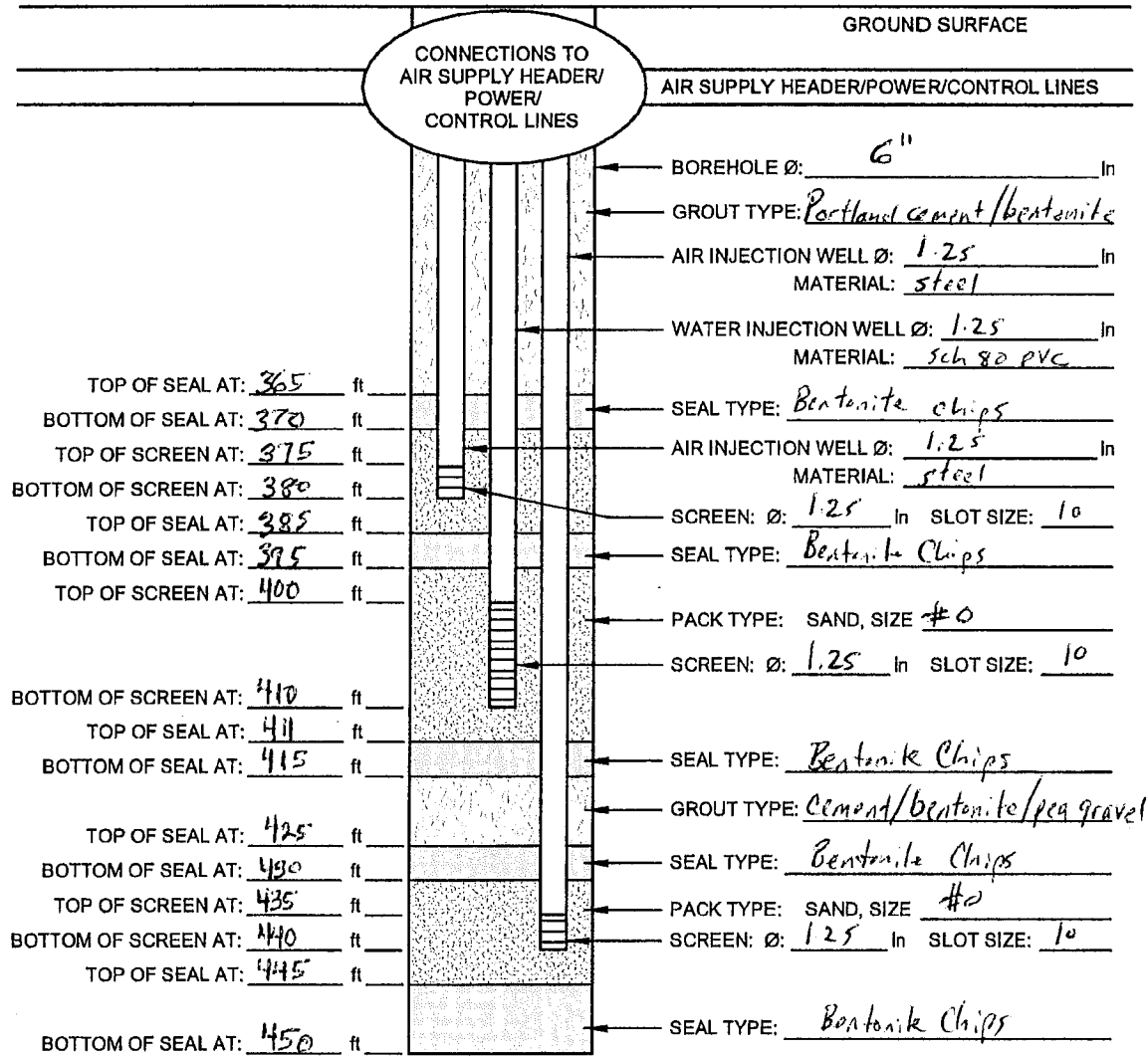
HOLE DESIGNATION ILW-21  
 DATE/TIME STARTED 10/14/10  
 DATE/TIME COMPLETED 10/21/10  
 DRILLING METHOD SAFIC  
 CRA SUPERVISOR S. Daly



# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSIHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: FW-21  
 DATE COMPLETED: 10/23/10  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ Plastic ☐ Other: \_\_\_\_\_

WATER: ☐ Stainless Steel ☒ Plastic ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 450' 7" to 290'

DEVELOPMENT: METHOD: Air lift DURATION: 1.5, 1.25, 1 hr (250 gals/each)

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 6

PROJECT NAME Hucker Ruco  
PROJECT NUMBER 6837  
CLIENT GSHZ  
LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
DRILLER Gerald Sealy  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-22  
DATE/TIME STARTED 10/24/10  
DATE/TIME COMPLETED 10/26/10  
DRILLING METHOD Jenic  
CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D F I D (ppm)	C H E M I C A L	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
0		37				tan brown fine-medium sand and gravel, some silt, loose									
37		54	dark gray/black silty clay, very stiff									0.0			
54		57	reddish brown medium sand, loose									0.0			
57		77	tan brown and light gray medium sand loose									0.0			
77		84	light gray medium sand, loose									0.0			
84		87	light gray silty clay, stiff									0.0			
87		94	light gray silty clay, stiff									0.0			
94		97	light gray fine-medium sand, some silt, loose									0.0			
97		100	light gray fine-medium sand, loose									0.0			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_

NOTES  
AND  
COMMENTS



# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 6

PROJECT NAME Hooker Run  
PROJECT NUMBER 2883  
CLIENT GSH  
LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
DRILLER Gerald Sealy  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-22  
DATE/TIME STARTED 10/24/10  
DATE/TIME COMPLETED 10/26/10  
DRILLING METHOD Sonic  
CRA SUPERVISOR J. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E T H I C K N E S S	SAMPLE DETAILS						S A M P L E R E C O V E R Y	P I D F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)										
						6"	6"	6"	6"	N	R					
106		107	light gray fine sand + silt, clay lenses, firm										0.0			
107		114	light gray silty clay w/ layers of fine sand, firm										0.0			
114		117	light gray fine-medium sand, loose										0.0			
117		127	light gray fine-medium sand, some silt, loose										0.0			
127		134	light gray fine sand + silt, some clay, firm										0.0			
134		137	light gray silty clay, stiff										0.0			
137		147	light gray medium sand, loose										0.0			
147		152	light gray medium sand, loose										0.0			
152		157	dark gray/black silty clay, stiff										0.0			
157		167	tan brown and light gray fine sand + silt, clay layers										0.0			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_





# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 6

PROJECT NAME Hacker Run  
PROJECT NUMBER 6883  
CLIENT GSHF  
LOCATION Hicksville, NY

DRILLING CONTRACTOR Baart Longyear  
DRILLER Gerald Sealy  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-22  
DATE/TIME STARTED 10/24/10  
DATE/TIME COMPLETED 10/26/10  
DRILLING METHOD Sonic  
CRA SUPERVISOR J. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E H I G H N O D	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D F I D  (ppm)	C H E M I C A L  A N A L Y S I S	G R A I N  S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
167		177	tan brown + light gray fine-medium sand + silt base										0.2		
177		180	SAME										0.3		
180		197	light gray + orange brown fine sand + silt, some clay, firm										0.1		
197		207	tan brown fine-medium sand + silt firm, trace clay										0.0		
207		212	tan brown fine-medium sand + silt, firm										0.0		
212		217	dark gray/black silty clay, stiff										0.0		
217		227	reddish brown fine sand, some silt, firm										0.0		
227		231	dark gray silty clay, stiff										0.0		
231		237	tan brown fine-medium sand w/ silt, firm										0.0		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_

NOTES  
AND  
COMMENTS



# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 4 OF 6

PROJECT NAME Hooker Ruco  
PROJECT NUMBER 6883  
CLIENT GSH+  
LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longyear  
DRILLER Gerald Sealy  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-22  
DATE/TIME STARTED 10/24/10  
DATE/TIME COMPLETED 10/26/10  
DRILLING METHOD Senic  
CRA SUPERVISOR S. Dally

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	8"	6"	8"	N	R					
237		257				orange brown medium sand, loose, some silt clay layer @ 244-245										
257		264	orange brown medium sand, some fine sand/silt loose									0.0				
264		277	tan brown + light gray fine sand + silt w/ some clay, firm, slight odor									0.3				
277		287	light gray fine sand + silt, firm, odor									0.8				
287		297	tan brown medium sand, loose, sweet odor									3.1				
297		308	tan brown medium sand, loose, sweet odor									1.3				
308		318	SAME									6.8				
318		325	SAME									2.4				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES:



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 5 OF 6

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6833  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
 DRILLER Gerald Dady  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-22  
 DATE/TIME STARTED 10/24/10  
 DATE/TIME COMPLETED 10/25/10  
 DRILLING METHOD Bar  
 CRA SUPERVISOR S. Dady

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										CHEMICALS	GRAIN SIZE
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D I D (ppm)		
						6"	6"	6"	6"	N	R				
325		327	dark gray silty clay, stiff											0.0	
327		344	light gray fine sand + silt, firm, odor											2.1	
344		348	tan brown medium sand, loose, odor											1.2	
348		361	reddish brown medium sand, loose, odor											0.8	
361		365	dark gray silty clay, stiff											0.0	
365		378	light gray fine sand + silt, firm, slight odor											4.8	
378		388	tan brown medium sand, loose, odor											3.8	
388		398	light gray medium sand, loose, odor											1.4	
398		408	reddish brown medium sand, loose, odor											1.0	
408		418	SAME											2.2	

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



PAGE 6 OF 6

DRILLING CONTRACTOR Beart Longyear  
DRILLER Gerald Searly  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION DW-22  
DATE/TIME STARTED 10/24/10  
DATE/TIME COMPLETED 10/26/10  
DRILLING METHOD Senic  
CRA SUPERVISOR J. Daly

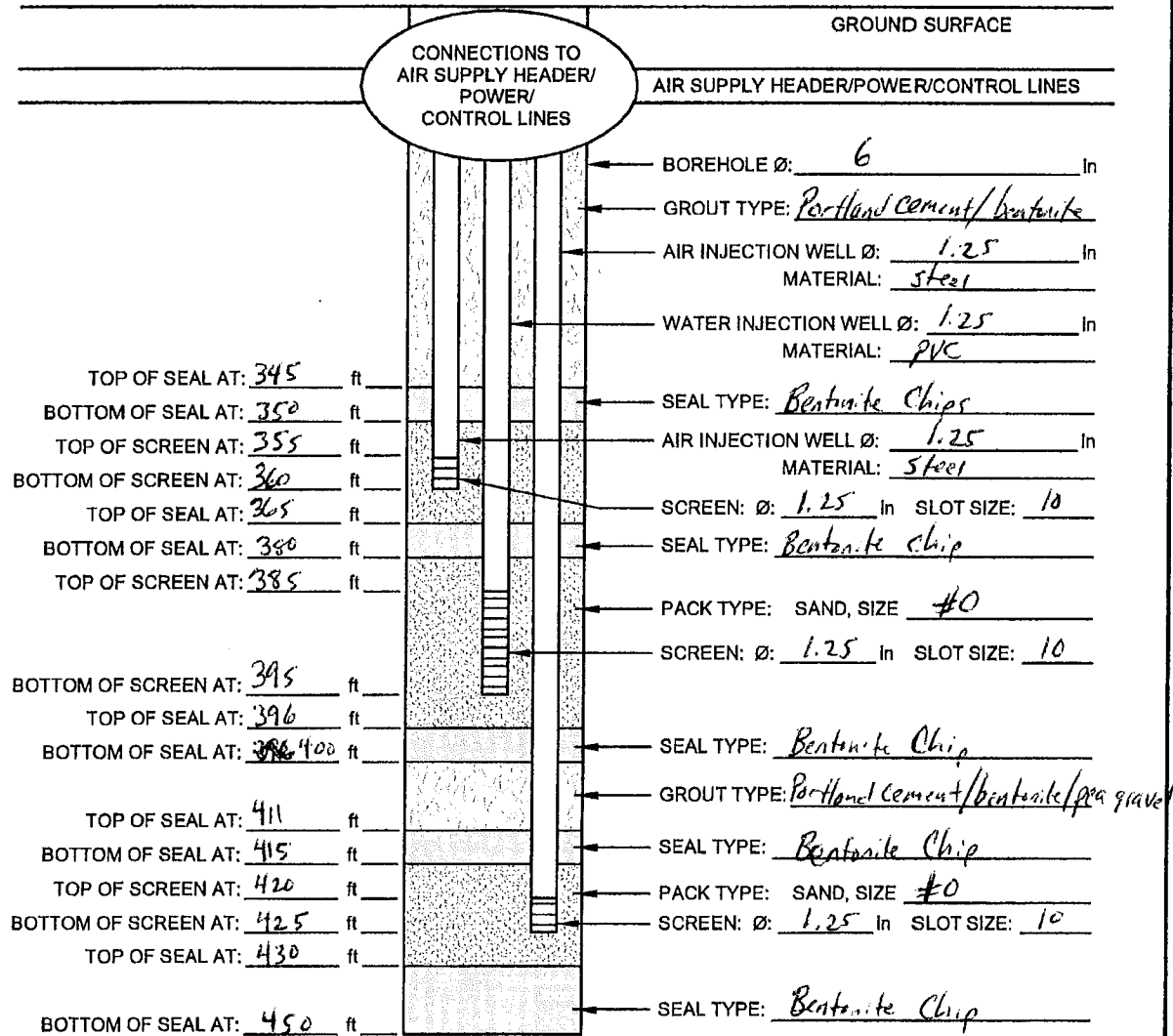
STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										S A M P L E #	S A M P L I N G	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E	I N T E R V A L	P I D / F I D  (ppm)						
				6"	6"	6"	6"	N	R									
418		425	reddish brown medium sand, loose, odor															
425		428	light gray fine sand + silt, trace clay, firm															
428		440	light gray fine sand + silt, clay lenses, firm															
440		450	reddish brown medium sand, some fine sand and silt, loose															
		450	END OF BORING															
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____	DEPTH OF FIRST GROUNDWATER ENCOUNTER _____	TOPSOIL THICKNESS _____													
			WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____															
			COMPLETION DETAILS: _____															
			NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.															
			NOTES: _____															



# INJECTION WELL INSTRUMENTATION LOG

PROJECT NAME: Honker Run  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: IW-22  
 DATE COMPLETED: 11/3/10  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 WATER: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☒ Stainless Steel ☐ Plastic ☐ Other: \_\_\_\_\_  
 WATER: ☐ Stainless Steel ☒ Plastic ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6" to 450' 7" to 290'  
 DEVELOPMENT: METHOD: Air Lift DURATION: 3, 1 hr (250 gals/each)

↑ N

MW-1  
CLUSTER

HAZEL STREET

U.P. 1  
UL-5

U.P. 2

A

B

Linden  
Tree

S. Oyster Bay Road

U.P. 3  
(UL#3)

MW-61 A

MW-61 B

- to MW-61 B = 12.3'
- to U.P. 1 (UL-5) = 52.1'
- to Linden tree = 22.2'
- to U.P. 3 (UL#3) = 90.'
- to U.P. 2 = 54'

- to MW-61 A = 12.3'
- to U.P. 1 (UL-5) = 63.0'
- to Linden tree = 18.5'
- to U.P. 3 (UL#3) = 78.5'
- to U.P. 2 = 63'



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61 S//D1

DATE COMPLETED: February 22, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
	GROUND SURFACE TOP OF RISER	121.19 120.91						
	SOIL, brown, some vegetation							
5		118.69		1	X			0
	SAND/soil, rock, brown/orange			2	X			0
10				3	X			0
15				4	X			0
20				5	X			0
25	- some clay inclusions, tan/black at 25.0ft BGS	95.19		6	X			0
	CLAY, stiff, moist			7	X			0
30	- very stiff clay at 29.0ft BGS			8	X			0
35		87.99		9	X			0
	SAND, tan/black			10	X			0
40				11	X			0
45	- stiff clay at 45.0ft BGS			12	X			0
50				13	X			0
55	- black, gray clay inclusions, moist at 52.0ft BGS	86.19		14	X			0
	- no clay at 54.0ft BGS			15	X			0
60	SANDY CLAY, tan/orange, wet	61.19						
	- sand, wet at 58.0ft BGS							
65								
	CLAY, dark gray, moist							
70		53.19						
	SAND, stiff, gray/tan, clay inclusions, light gray							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/15/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61 S/I/D1

DATE COMPLETED: February 22, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	- gray/orange layering, moist at 75.0ft BGS			16	X			0
80	- tan/orange, moist at 80.0ft BGS			17	X			0
85	- wet at 85.0ft BGS			18	X			0
90				19	X			0
95				20	X			0
100				21	X			0
105				22	X			0
110				23	X			0
115	- light gray clay inclusions at 114.0ft BGS - light gray clay inclusions at 115.5ft BGS			24	X			0
120	- some gray clay at 120.5ft BGS			25	X			0
125				26	X			0
130	- Groundwater sample collected at 130.0ft BGS			27	X			0
135	CLAY, red/brown, moist - dark gray clay, very stiff, dry at 136.0ft BGS	-13.31		28	X			0
140				29	X			0
145	- wet at 145.0ft BGS			30	X			0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/15/02





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61 S//D1

DATE COMPLETED: February 22, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
155	- dry to moist at 151.0ft BGS			31				0
160				32				0
165	SAND, brown/orange, saturated - light gray clay inclusions at 161.5ft BGS	-38.81	CEMENT/ 8% BENTONITE GROUT BENTONITE CHIPS	33				0
170			SAND PACK	34				0
175	- stiff clay at 173.0ft BGS		WELL SCREEN	35				0
180	- stiff clay inclusions at 177.0ft BGS			36				0
185	SAND, with clay inclusions, gray/tan - no clay at 183.5ft BGS - Groundwater sample collected at 185.0ft BGS	-58.81		37				0
190	- dark gray/black with some clay inclusions at 191.0ft BGS	-70.31	2" Ø BLACK STEEL RISER	38				0
195	CLAY, stiff, light gray/bright orange	-73.81	BENTONITE CHIPS	39				0
200	SAND, some clay, light gray/tan orange			40				0
205	CLAY, stiff, gray, with tan/orange sand	-78.81		41				0
210	SAND, orange/brown, wet	-79.81		42				0
215	- clay inclusions at 210.0ft BGS		SAND PACK	43				0
220	- tan/orange at 215.0ft BGS		WELL SCREEN	44				0
	- stiff sandy clay, tan/orange at 219.0ft BGS			45				0
	- stiff clay inclusions at 220.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/15/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION


LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61 S/I/D1

DATE COMPLETED: February 22, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	"N" VALUE	PID (ppm)
230	CLAY, stiff, tan/orange sand, wet	-103.81	 BENTONITE CHIPS 2" Ø BLACK STEEL RISER SAND PACK WELL SCREEN	46	X			0
235	SAND, brown/tan, reddish, wet - clay, stiff at 236.0ft BGS	-113.81		47	X			0
240	CLAY, stiff, dark gray - wet at 243.0ft BGS	-118.81		48	X			0
245				49	X			0.4
250	SAND, tan/orange, wet	-128.81		50	X			0
255	- Groundwater sample collected at 255.0ft BGS			51	X			20.1
260				52	X			12.1
265				53	X			13.2
270				54	X			24.4
275	SANDY CLAY, gray/orange, stiff	-150.81		55	X			10.3
280	SAND, light gray clay inclusions, some red	-156.81		56	X			6.0
285	CLAY, very stiff, gray	-163.81		57	X			0.8
290				58	X			0
295								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/15/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION


LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61 S/I/D1

DATE COMPLETED: February 22, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
305	SANDY CLAY, pink/red gray, moist. Groundwater sample collected at 305.0ft BGS	-183.81	 BENTONITE CHIPS	59				0
310				60				0
315	SAND, gray/tan, dry to moist	-193.81		61				0
320	- tan/orange, moist at 320.0ft BGS - some light gray clay inclusions at 321.5ft BGS			62				0
325	SANDY CLAY, tan/gray, saturated	-203.81		63				0
330	- some clay inclusions, wet at 331.0ft BGS			64				0
335	CLAY, very stiff, tan/gray	-211.81		65				0
	SAND, orange/brown/tan	-213.81		66				0
345	SANDY CLAY, firm, tan/orange - very stiff dark gray clay at 346.0ft BGS	-223.81		67				0
355	SAND, gray/tan - Groundwater sample collected at 355.0ft BGS END OF BOREHOLE @ 355.0ft BGS	-231.81 -233.81		68				0
<b>WELL DETAILS</b> Screened Interval: -48.81 to -58.81ft AMSL 170.00 to 180.00ft BGS Length: 10ft Diameter: 2in Slot Size: #10 Material: S.S. Sand Pack: -43.81 to -63.81ft AMSL 165.00 to 185.00ft BGS Material: SILICA SAND  Screened Interval: -83.81 to -93.81ft AMSL								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/15/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO

HOLE DESIGNATION: MW-61 S/I/D1

PROJECT NUMBER: 6883

DATE COMPLETED: February 22, 2002

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
380			205.00 to 215.00ft BGS Length: 10ft Diameter: 2in Slot Size: #10 Material: S.S. Sand Pack: -78.81 to -88.81ft AMSL 200.00 to 220.00ft BGS Material: SILICA SAND					
385								
390			Screened Interval: -148.81 to -158.81ft AMSL 270.00 to 280.00ft BGS Length: 10ft Diameter: 2in Slot Size: #10 Material: S.S. Sand Pack: -143.81 to -163.81ft AMSL 265.00 to 285.00ft BGS Material: SILICA SAND					
395								
400								
405								
410								
415								
420								
425								
430								
435								
440								
445								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/15/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61D2

DATE COMPLETED: March 12, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
	GROUND SURFACE TOP OF RISER	121.15 121.05						
	SOIL, brown, some vegetation							
5	SAND/soil, rock, brown/orange	116.65		1	X			0
10				2	X			0
15				3	X			0
20				4	X			0
25	- some clay inclusions, tan/black at 25.0ft BGS			5	X			0
30	CLAY, stiff, moist	95.15		6	X			0
	- very stiff clay at 29.0ft BGS			7	X			0
35	SAND, tan/black	87.95		8	X			0
40				9	X			0
45	- stiff clay at 45.0ft BGS			10	X			0
50				11	X			0
55	- black, gray clay inclusions, moist at 52.0ft BGS			12	X			0
	- no clay at 54.0ft BGS	66.15		13	X			0
60	SANDY CLAY, tan/orange, wet			14	X			0
	- sand, wet at 58.0ft BGS			15	X			0
65	CLAY, dark gray, moist	61.15						
70	SAND, stiff, gray/tan, clay inclusions, light gray	53.15						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/23/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61D2

DATE COMPLETED: March 12, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
	- gray/orange layering, moist at 75.0ft BGS			16	X			0
80	- tan/orange, moist at 80.0ft BGS			17	X			0
85	- wet at 85.0ft BGS			18	X			0
90			CEMENT/ 6% BENTONITE GROUT	19	X			0
95				20	X			0
100				21	X			0
105				22	X			0
110				23	X			0
115	- light gray clay inclusions at 114.0ft BGS - light gray clay inclusions at 115.5ft BGS			24	X			0
120	- some gray clay at 120.5ft BGS		2" Ø BLACK STEEL RISER	25	X			0
125				26	X			0
130	- Groundwater sample collected at 130.0ft BGS			27	X			0
135	CLAY, red/brown, moist - dark gray clay, very stiff, dry at 136.0ft BGS	-13.35		28	X			0
140				29	X			0
145	- wet at 145.0ft BGS			30	X			0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/23/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61D2

DATE COMPLETED: March 12, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
155	- dry to moist at 151.0ft BGS		CEMENT/ 6% BENTONITE GROUT	31	X			0
160	SAND, brown/orange, saturated - light gray clay inclusions at 161.5ft BGS	-38.85		32	X			0
165				33	X			0
170				34	X			0
175	- stiff clay at 173.0ft BGS		2" Ø BLACK STEEL RISER	35	X			0
180	- stiff clay inclusions at 177.0ft BGS			36	X			0
185	SAND, with clay inclusions, gray/tan - no clay at 183.5ft BGS - Groundwater sample collected at 185.0ft BGS	-58.85		37	X			0
190	- dark gray/black with some clay inclusions at 191.0ft BGS	-70.35		38	X			0
195	CLAY, stiff, light gray/bright orange	-73.85		39	X			0
200	SAND, some clay, light gray/tan orange			40	X			0
205	CLAY, stiff, gray, with tan/orange sand	-78.85		41	X			0
210	SAND, orange/brown, wet	-79.85		42	X			0
215	- clay inclusions at 210.0ft BGS			43	X			0
220	- tan/orange at 215.0ft BGS			44	X			0
	- stiff sandy clay, tan/orange at 219.0ft BGS			45	X			0
	- stiff clay inclusions at 220.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/23/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61D2

DATE COMPLETED: March 12, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
230	CLAY, stiff, tan/orange sand, wet	-103.85		46	X			0
235	SAND, brown/tan, reddish, wet - clay, stiff at 238.0ft BGS	-113.85		47	X			0
240	CLAY, stiff, dark gray - wet at 243.0ft BGS	-118.85		48	X			0
245				49	X			0.4
250	SAND, tan/orange, wet	-128.85		50	X			0
255	- Groundwater sample collected at 255.0ft BGS			51	X			20.1
260				52	X			12.1
265				53	X			13.2
270				54	X			24.4
275	SANDY CLAY, gray/orange, stiff	-150.85		55	X			10.3
280	SAND, light gray clay inclusions, some red	-158.85		56	X			6.0
285	CLAY, very stiff, gray	-163.85		57	X			0.8
290				58	X			0
295								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/23/02





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION


LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61D2

DATE COMPLETED: March 12, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
305	SANDY CLAY, pink/red gray, moist. Groundwater sample collected at 305.0ft BGS	-183.85	 CEMENT/ 6% BENTONITE GROUT	59	X			0
310				60	X			0
315	SAND, gray/tan, dry to moist	-193.85		61	X			0
320	- tan/orange, moist at 320.0ft BGS - some light gray clay inclusions at 321.5ft BGS			62	X			0
325	SANDY CLAY, tan/gray, saturated	-203.85		63	X			0
330	- some clay inclusions, wet at 331.0ft BGS			64	X			0
335	CLAY, very stiff, tan/gray	-211.85		65	X			0
340	SAND, orange/brown/tan	-213.85		66	X			0
345	SANDY CLAY, firm, tan/orange - very stiff dark gray clay at 346.0ft BGS	-223.85		67	X			0
350				68	X			0
355	SAND, gray/tan - Groundwater sample collected at 355.0ft BGS	-231.85		69	X			19.8
360	CLAY, stiff, gray, moist	-236.85		70	X			10.3
365			SAND PACK	71	X			53.1
370	SAND, wet, little clay	-244.85		72	X			45.3

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/23/02



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO

PROJECT NUMBER: 6883

CLIENT: OCCIDENTAL CHEMICAL CORPORATION


LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-61D2

DATE COMPLETED: March 12, 2002

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: L. HAMILTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
	SANDY CLAY, tan, wet - tan/orange clay, stiff at 376.0ft BGS	-253.85	 SAND PACK  BENTONITE CHIPS	73	X			0.3
380	SAND, tan with some gray clay	-257.85		74	X			2.7
385				75	X			1.4
390				76	X			NM
395				77	X			0
400				78	X			0
405	- Groundwater sample collected at 405.0ft BGS END OF BOREHOLE @ 405.0ft BGS	-283.85						
410			<b>WELL DETAILS</b> Screened Interval: -243.85 to -253.85ft AMSL 365.00 to 376.00ft BGS Length: 10ft Diameter: 2in Slot Size: #10 Material: S.S. Sand Pack: -238.85 to -258.85ft AMSL 360.00 to 380.00ft BGS Material: SILICA SAND					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 7/23/02

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 4

PROJECT NAME Hooker Ruco  
PROJECT NUMBER 6883  
CLIENT GSH  
LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
DRILLER \_\_\_\_\_  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-70  
DATE/TIME STARTED 1/28/11  
DATE/TIME COMPLETED 1/30/11  
DRILLING METHOD Sonic  
CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E L I G H T N O D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R					
0		37				tan brown med-coarse sand and gravel cobbles, loose										
37		49	tan brown + reddish brown fine to medium sand, dry, strong odor at 45-49' <del>2049'</del> sour									147				
49		57	tan brown fine-medium sand, loose									0.0				
57		74	tan brown to light gray medium sand, loose									0.2				
74		77	light gray fine sand + silt, firm									0.0				
77		81	light gray + tan brown fine sand + silt, firm									0.0				
81		97	tan brown + light gray medium sand, loose									0.4				
97		104	light gray + tan brown fine sand + silt, trace clay firm									0.0				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 4

PROJECT NAME Hockar Ruco  
PROJECT NUMBER 6537  
CLIENT ASHF  
LOCATION Hicksville, NY

DRILLING CONTRACTOR \_\_\_\_\_  
DRILLER \_\_\_\_\_  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-70  
DATE/TIME STARTED 1/28/11  
DATE/TIME COMPLETED 1/30/11  
DRILLING METHOD Shank  
CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L #	SAMPLE DETAILS						S I N T E R V A L #	P I D I D (ppm)	C H E M I C A L S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
104		117	light gray medium sand, some fine sand, loose									0.3			
			silty clay												
117		130	light gray + tan brown, some fine sand, stiff									1.4			
130		137	gray medium sand, sweet odor, loose									10.6			
137		157	tan brown + light gray fine-medium sand, firm									4.6			
157		177	tan brown + light gray medium sand, loose									2.4			
177		197	light gray medium sand, loose									1.7			
197		207	tan brown fine sand, firm									1.1			
207		215	tan brown fine sand + silt, clay lenses, firm									4.3			
215		220	light gray silty clay, stiff									0.8			
220		227	light gray fine sand, loose									4.6			
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____												
			WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER _____ HOURS _____												
			COMPLETION DETAILS: _____												
			NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.												
			NOTES: _____												



# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 4

PROJECT NAME Hacker Ruco  
PROJECT NUMBER 6883  
CLIENT GSHF  
LOCATION Hicksville, NY

DRILLING CONTRACTOR \_\_\_\_\_  
DRILLER \_\_\_\_\_  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-70  
DATE/TIME STARTED 4/28/11  
DATE/TIME COMPLETED 1/31/11  
DRILLING METHOD Sonic  
CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/in BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E H I G H T I N O D	SAMPLE DETAILS							S A M P L E I N T E R V A L	P I D I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)										
						6"	6"	6"	6"	N	R					
227		234	tan brown fine sand + silt, firm, trace clay										1.7			
234		244	dark gray/black silty clay, very stiff										0.0			
244		247	tan brown medium sand, loose										10.7			
247		257	tan brown medium sand, loose										26.7			
265		277	tan brown + light gray fine sand + silt, firm										3.1			
277		292	tan brown + light gray fine sand + silt, firm clay 290-292										2.5			
													0.3			
292		297	tan brown fine-medium sand, loose										1.9			
297		302	tan brown fine-medium sand, loose													
302		335	dark gray/black silty clay, very stiff										0.0			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_

DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_

TOPSOIL THICKNESS \_\_\_\_\_

NOTES AND COMMENTS



PAGE 4 OF 4

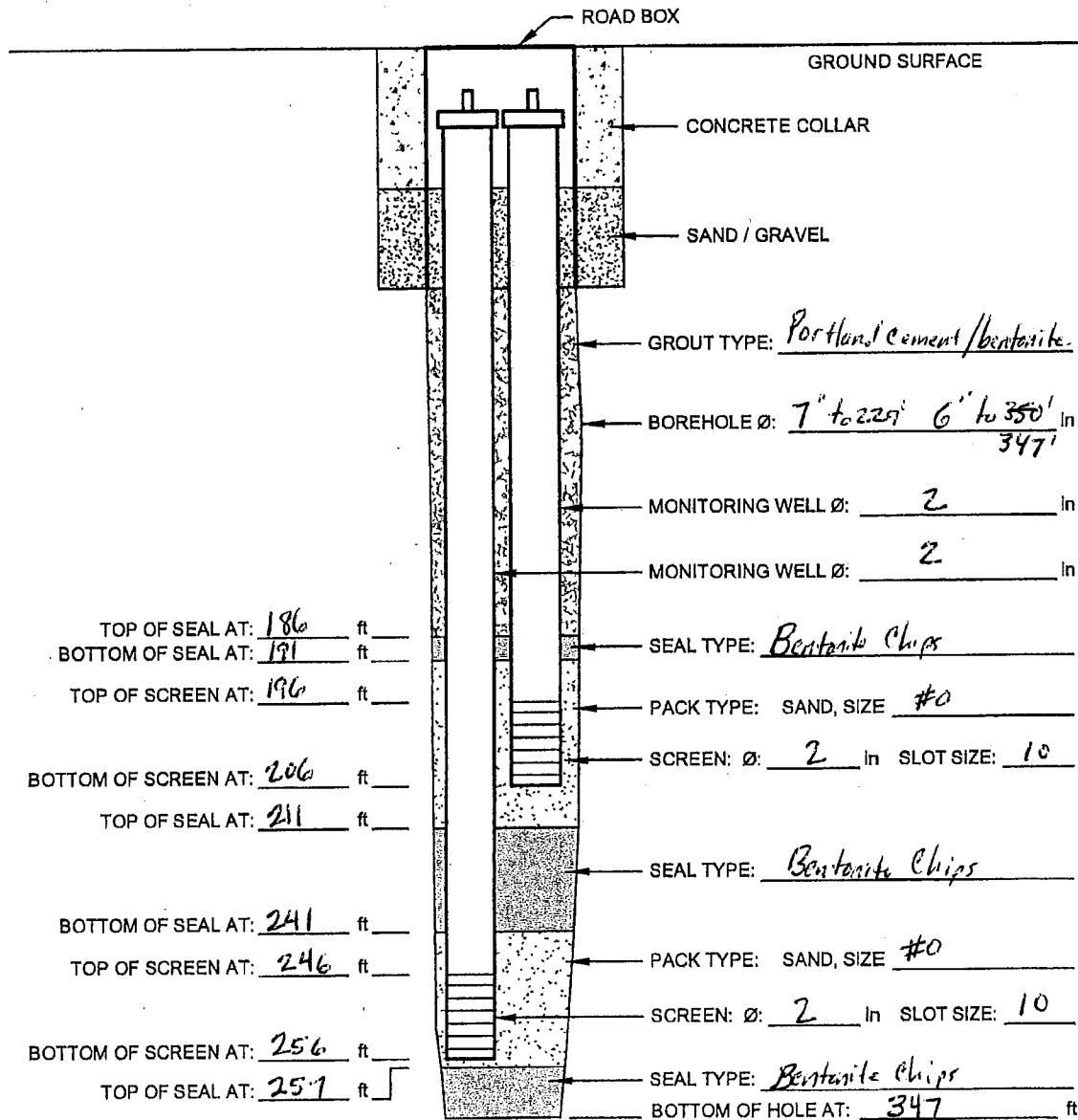
DRILLING CONTRACTOR \_\_\_\_\_  
DRILLER \_\_\_\_\_  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-70  
DATE/TIME STARTED 1/23/11  
DATE/TIME COMPLETED 1/30/11  
DRILLING METHOD Surf  
CRA SUPERVISOR S. Dohy

[illegible]

# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco HOLE DESIGNATION: MW-70  
 PROJECT No: 6883 DATE COMPLETED: 2/2/11  
 CLIENT: GSHI DRILLING METHOD: Source  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347' 7" to 207' in

DEVELOPMENT: METHOD: Air-lift DURATION: \_\_\_\_\_

# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 3

PROJECT NAME Hooker, Rulo  
 PROJECT NUMBER 6883  
 CLIENT GSH&  
 LOCATION Hicksville, NY

DILLING CONTRACTOR Boart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-72  
 DATE/TIME STARTED 3/13/11  
 DATE/TIME COMPLETED 3/14/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										CHEMICAL ANALYSIS	GRAIN SIZE
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	DEPTH IN FOOT	PENETRATION RECORD SPLIT SPOON BLOW (RECORD N-VALUES & RECOVERIES)						SAMPLE INTERVAL	P / F ID ID (ppm)		
						6"	6"	6"	6"	N	R				
0		37	tan brown medium-coarse sand + gravel, fine sand and silt, loose											0.0	
37		49	light tan brown medium sand, some gravel, loose s.c. 48'											0.0	
49		57	light brown + light gray fine sand + silt, firm											0.0	
57		73	light gray medium sand, loose											0.0	
73		77	light gray fine sand + silt, firm											0.0	
77		97	tan brown + light gray medium sand, loose											0.0	
97		117	tan brown fine-medium sand + silt, firm											0.0	
117		132	tan brown fine-medium sand + silt, firm, some clay pockets, slight sweet odor											1.1	
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____												





# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 3

PROJECT NAME Hodder Ruio  
 PROJECT NUMBER 6887  
 CLIENT GSH&E  
 LOCATION Hicksville, NY

DRIILLING CONTRACTOR Boat Langyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-72  
 DATE/TIME STARTED 3/13/11  
 DATE/TIME COMPLETED 3/14/11  
 DRILLING METHOD Senic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION <small>ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).</small>	S A M P L E #	S A M P L E I N O D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
132		137				light gray medium sand, loose, no odor									
137		157	light gray + light brown fine-medium sand, some silt firm									0.7			
157		165	light brown fine-medium sand + silt, firm									0.4			
165		177	light brown medium sand, loose									1.2			
177		192	light brown/light gray medium sand, loose									1.1			
192		197	light brown fine-medium sand, firm									0.5			
197		207	tan brown medium sand, some fine sand + silt, firm									0.8			
207		227	tan brown fine sand + silt, some clay, firm									1.6			
227		238	tan brown medium sand, some fine sand + silt, firm									2.2			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES: \_\_\_\_\_



# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 7

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6887  
 CLIENT GSH&  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boat Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-72  
 DATE/TIME STARTED 3/17/11  
 DATE/TIME COMPLETED 3/14/11  
 DRILLING METHOD sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION <small>ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).</small>	S A M P L E #	S A M P L E I N D I C A T O R	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / P I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
238		247	dark gray silty clay, stiff									0.0			
247		257	tan brown medium sand, some fine sand + silt, loose									0.3			
257		277	tan brown medium sand, some fine sand + silt, firm clay lenses at 273-276									11.5			
277		297	tan brown + light gray fine sand + silt, firm medium sand layer @ 280-285'									5.0			
297		302	tan brown fine-medium sand + silt, firm									0.5			
302		332	dark gray silty clay, stiff									0.0			
332		340	light gray fine sand + silt, firm									0.0			
340		347	light gray fine-medium sand, loose									1.7			
		347	End of boring												

NOTES AND COMMENTS

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES: \_\_\_\_\_



# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hoolar Run

HOLE DESIGNATION: MW-72

PROJECT No: 6883

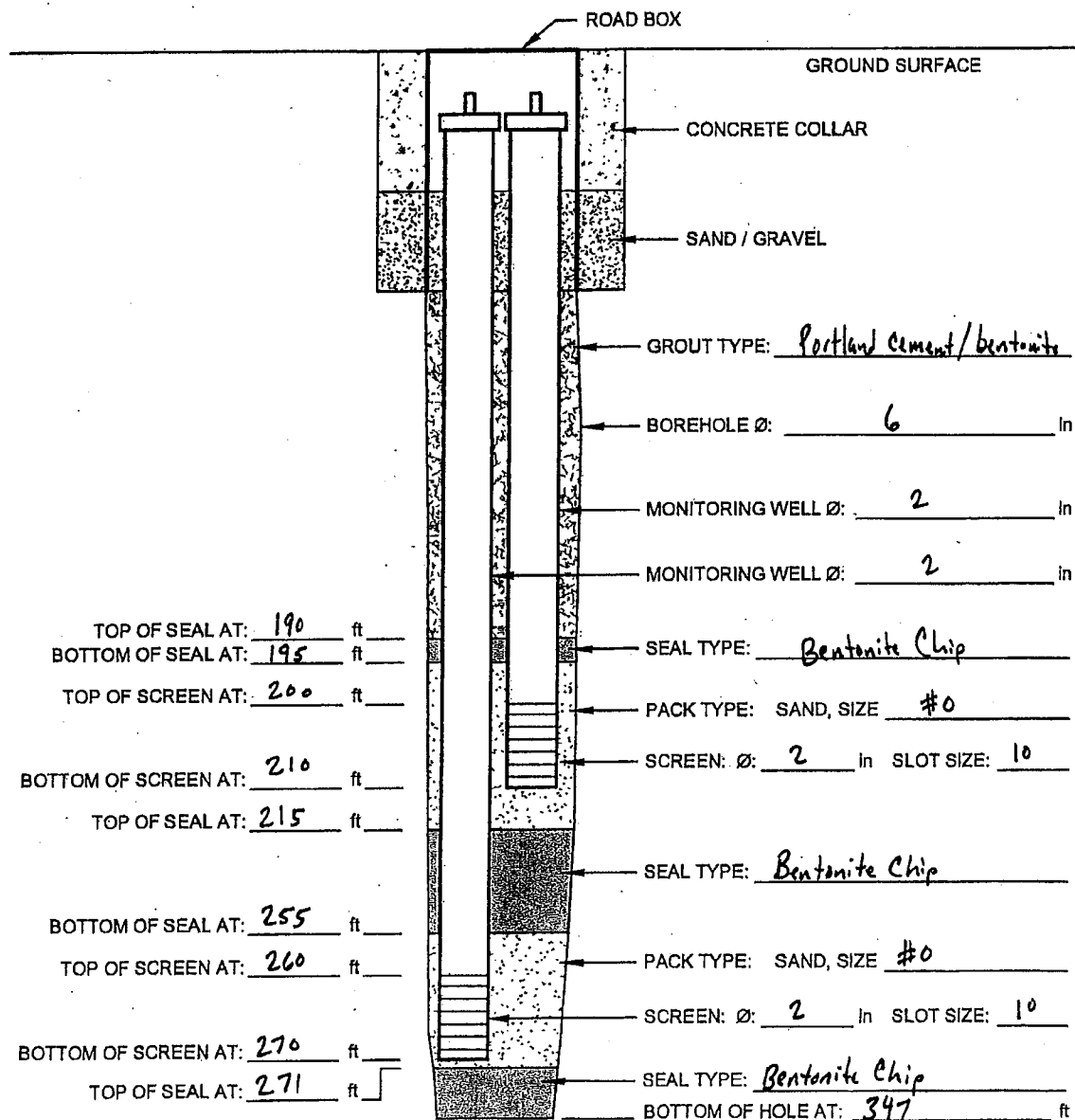
DATE COMPLETED: 3/16/11

CLIENT: GSHI

DRILLING METHOD: Sonic

LOCATION: Hicksville, NY

CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347 7" to 217' in D1 D2 D1 D2

DEVELOPMENT: METHOD: Air lift DURATION: 2 + 2.5 hrs (900 + 1,000 gals)

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 of 4

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6883  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DILLING CONTRACTOR Beard Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-73  
 DATE/TIME STARTED 2/2/11  
 DATE/TIME COMPLETED 2/10/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Only

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E I N T E R V A L #	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
0		37	tan brown medium to coarse sand + gravel some fine sand + silt, loose										0.0		
37		50	light gray fine sand + silt, loose										0.0		
50		57	tan brown fine-med sand, some silt, firm at 50'										0.0		
57		65	tan brown + light gray fine sand + silt, firm orange mottles										0.2		
65		77	light brown medium sand, loose										0.7		
77		84	light brown medium sand, loose										0.0		
84		92	light gray fine sand + silt, firm										0.0		
92		95	tan brown medium sand, loose										0.0		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES:



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 4

PROJECT NAME Hosker-Ruco  
 PROJECT NUMBER 6883  
 CLIENT GJH  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-73  
 DATE/TIME STARTED 2/2/11  
 DATE/TIME COMPLETED 2/10/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR J. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
95		97				light gray clay, stiff									
97		115	dark gray silty clay, stiff									0.0			
115		117	light gray fine-medium sand, loose									0.2			
117		137	light gray fine-medium sand, loose									0.9			
137		157	light gray medium sand, loose, slight odor									1.3			
157		167	light gray medium sand, no odor									0.1			
167		177	No Recovery									—			
177		197	tan brown medium sand, loose, slight odor									1.5			
197		207	tan brown fine-medium sand, some silt, firm, no odor									0.8			
207		220	tan brown fine-medium sand, some silt firm, no odor									3.1			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 4

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6883  
 CLIENT GSHS  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-73  
 DATE/TIME STARTED 2/2/11  
 DATE/TIME COMPLETED 2/12/11  
 DRILLING METHOD Senic  
 CRA SUPERVISOR S. Dufy

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/in BGS)			SAMPLE DESCRIPTION	SAMPLE #	SAMPLING DEPTH NO. OF	SAMPLE DETAILS						SAMPLING INTERVAL	P / F ID (ppm)	CHEMICALS	GRAIN SIZE
FROM	TO	AT				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
220	230		tan brown medium sand, loose										1.8		
230	247		tan brown fine sand + silt, clay @ 234-235 firm										0.5		
247	257		tan brown + light gray layered fine sand + silt, firm										0.3		
257	267		tan brown medium sand, loose, odor										18.5		
267	277		tan + reddish brown medium sand, loose, odor										22.6		
277	287		tan + reddish brown medium sand, loose, odor										13.5		
287	297		tan + reddish brown medium sand, loose, odor										6.4		
297	307		tan brown medium sand, loose, slight odor										17.4		
307	317		light gray fine-medium sand + silt, firm										6.7		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_  
 WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_  
 COMPLETION DETAILS: \_\_\_\_\_  
 NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.  
 NOTES: \_\_\_\_\_

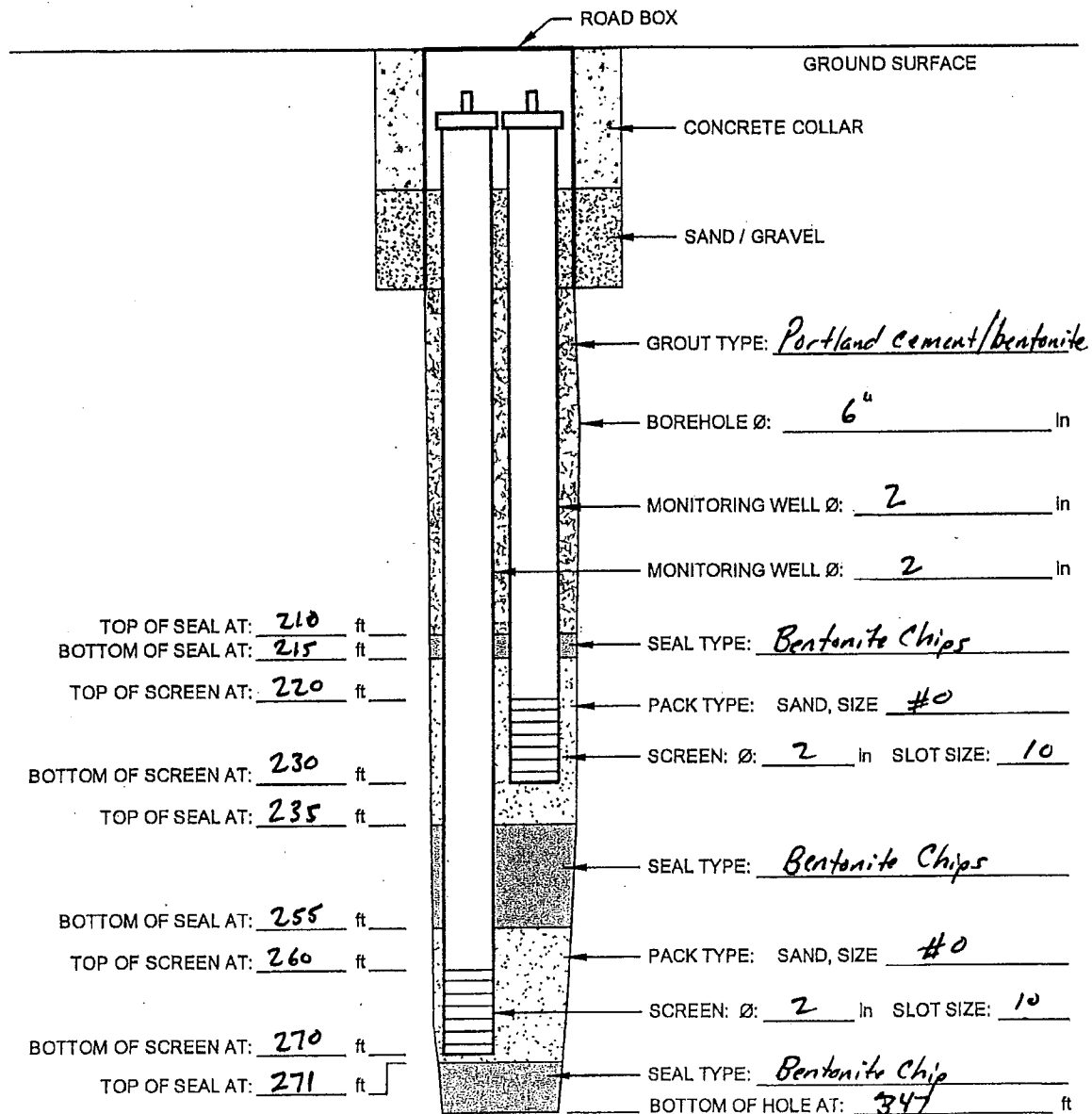
NOTES AND COMMENTS





# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco HOLE DESIGNATION: MW-73  
 PROJECT No: 6883 DATE COMPLETED: 2/11/11  
 CLIENT: GSHI DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347 7" to 237' in

DEVELOPMENT: METHOD: Air Lift DURATION: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 of 3

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6883  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Beart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-75  
 DATE/TIME STARTED 4/29/11 4/29/11  
 DATE/TIME COMPLETED 5/1/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS in ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N F O R M A T I O N	SAMPLE DETAILS							S I M T E R V A L	P I D I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWES (RECORD N-VALUES & RECOVERIES)											
						6"	6"	6"	6"	N	R						
0		37	tan brown medium coarse sand & gravel loose, some fine sand & silt										0.0				
37		57	tan brown fine-medium sand, some gravel, loose SC 50'										2.5				
57		75	light tan, light gray & reddish brown medium coarse sand, loose										0.2				
75		87	light gray fine-medium sand, loose										0.2				
87		97	dark gray/black silty clay, stiff										0.0				
97		112	tan brown fine sand & silt, firm										0.1				
112		117	No Recovery										—				
117		147	light gray fine-medium sand, some silt, loose odor										6.2				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_





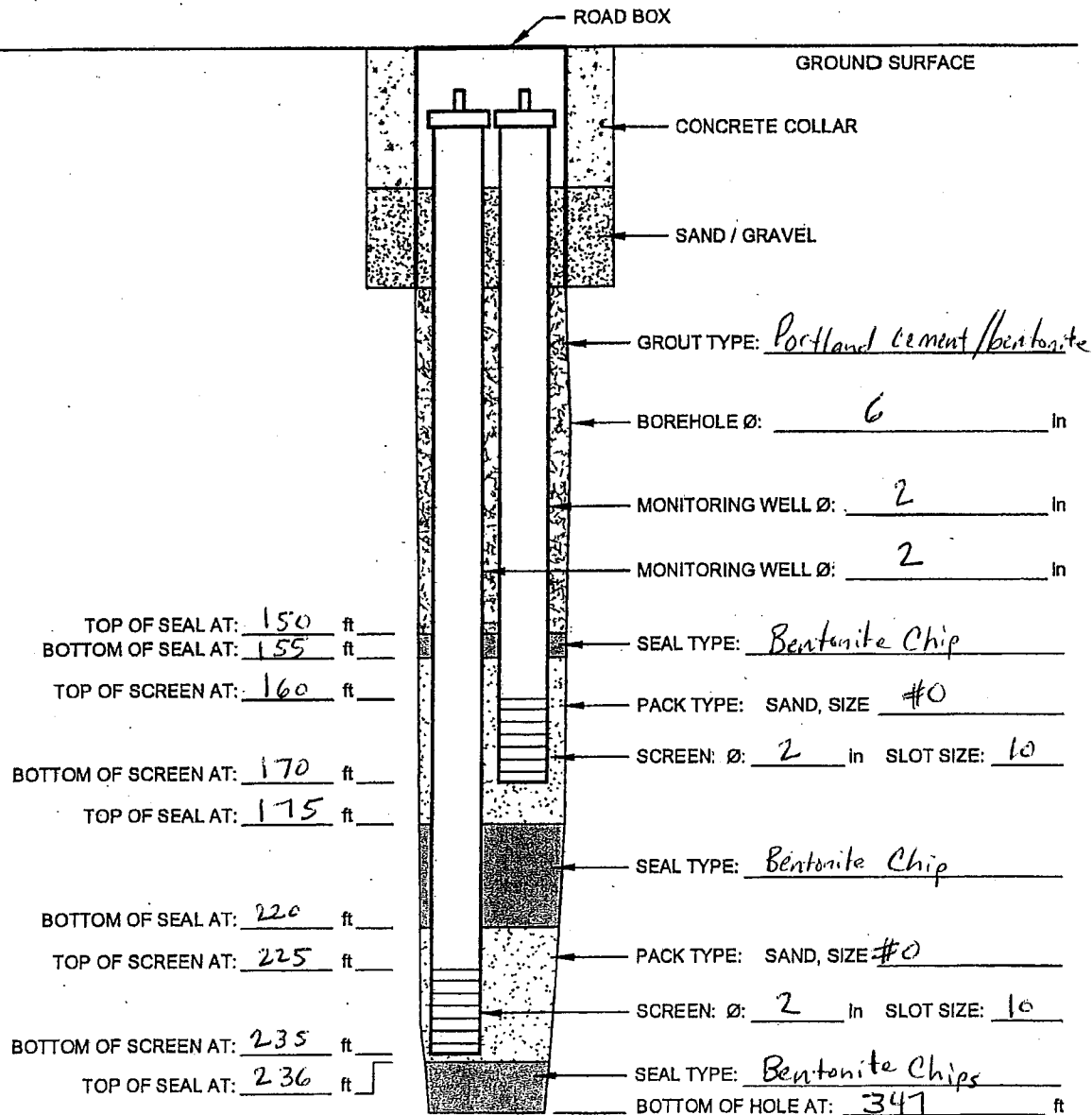
PAGE 3 OF 3

HOLE DESIGNATION MLW-75  
DATE/TIME STARTED 4/29/11  
DATE/TIME COMPLETED 5/1/11  
DRILLING METHOD Sonic  
CRA SUPERVISOR S. Duly

# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: MW-75  
 DATE COMPLETED: 5/2/11  
 DRILLING METHOD: sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347 7" to 171' in

DEVELOPMENT: METHOD: Air lift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 3

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER 6883  
 CLIENT GS/HE  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-76  
 DATE/TIME STARTED 2/12/11  
 DATE/TIME COMPLETED 2/14/11  
 DRILLING METHOD SD-11.5  
 CRA SUPERVISOR S. Dohy

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E L I N G D	SAMPLE DETAILS						S I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)										
						6"	6"	6"	6"	N	R					
0		37	tan brown med-coarse sand + gravel some fine sand + silt, loose, dry										0.6			
37		57	tan brown med sand, loose										0.9			
		48	water at 48'													
48		57	light brown fine sand + silt, firm										0.0			
57		77	tan brown to light gray fine sand + silt, trace clay firm										0.0			
77		97	light gray + tan brown medium sand, loose										0.0			
97		97	light gray to black silty clay, stiff										0.0			
97		103	same										0.0			
103		117	dark gray/black silty clay tan brown + light gray silty clay fine sand, firm										0.4			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES AND COMMENTS



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 2

PROJECT NAME Hacker Run  
 PROJECT NUMBER 0887  
 CLIENT CSHE  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bent Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-76  
 DATE/TIME STARTED 2/12/11  
 DATE/TIME COMPLETED 2/14/11  
 DRILLING METHOD Shelby  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L S	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
117		125	tan brown + light gray silty fine sand, firm										0.7		
125		132	light gray medium sand, loose, odor										7.5		
132		137	light gray fine sand + silt, firm, odor										1.6		
137		147	light gray fine sand + silt, firm, odor										1.6		
147		167	light gray/light brown fine-medium sand, some silt loose, odor										5.4		
167		177	tan brown medium sand, loose, slight odor										1.1		
177		197	tan brown + light gray fine-medium sand, firm										3.0		
197		207	light gray medium sand, loose, odor										2.1		
207		227	light gray + tan brown fine sand + silt w/ a pocket of medium sand (loose) @ 222-224										3.2		
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____												



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 3

PROJECT NAME Hicksville  
 PROJECT NUMBER 6889  
 CLIENT USAF  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bogert Lutzner  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-76  
 DATE/TIME STARTED 2/12/11  
 DATE/TIME COMPLETED 2/14/11  
 DRILLING METHOD Shovel  
 CRA SUPERVISOR J. O'Neil

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										S A M P L E I N T E R V A L	P I D P I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L #	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L					
						6"	6"	6"	6"	N	R						
227		235	tan brown fine-medium sand & silt, firm												10.8		
235		250	dark gray/black silty clay, stiff												0.0		
250		257	tan brown fine sand & silt, some medium sand pockets, odor												49.3		
257		277	tan brown medium sand, loose, odor												27.6		
277		285	tan brown & light gray fine sand & silt, some clay, firm												0.5		
285		297	light gray medium sand, loose												0.2		
297		301	tan brown medium sand, loose												1.2		
301		342	dark gray/black silty clay, very stiff												0.0		
342		347	light gray fine-medium sand, some silt, firm												0.0		
	347		END OF BORING														

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOP SOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

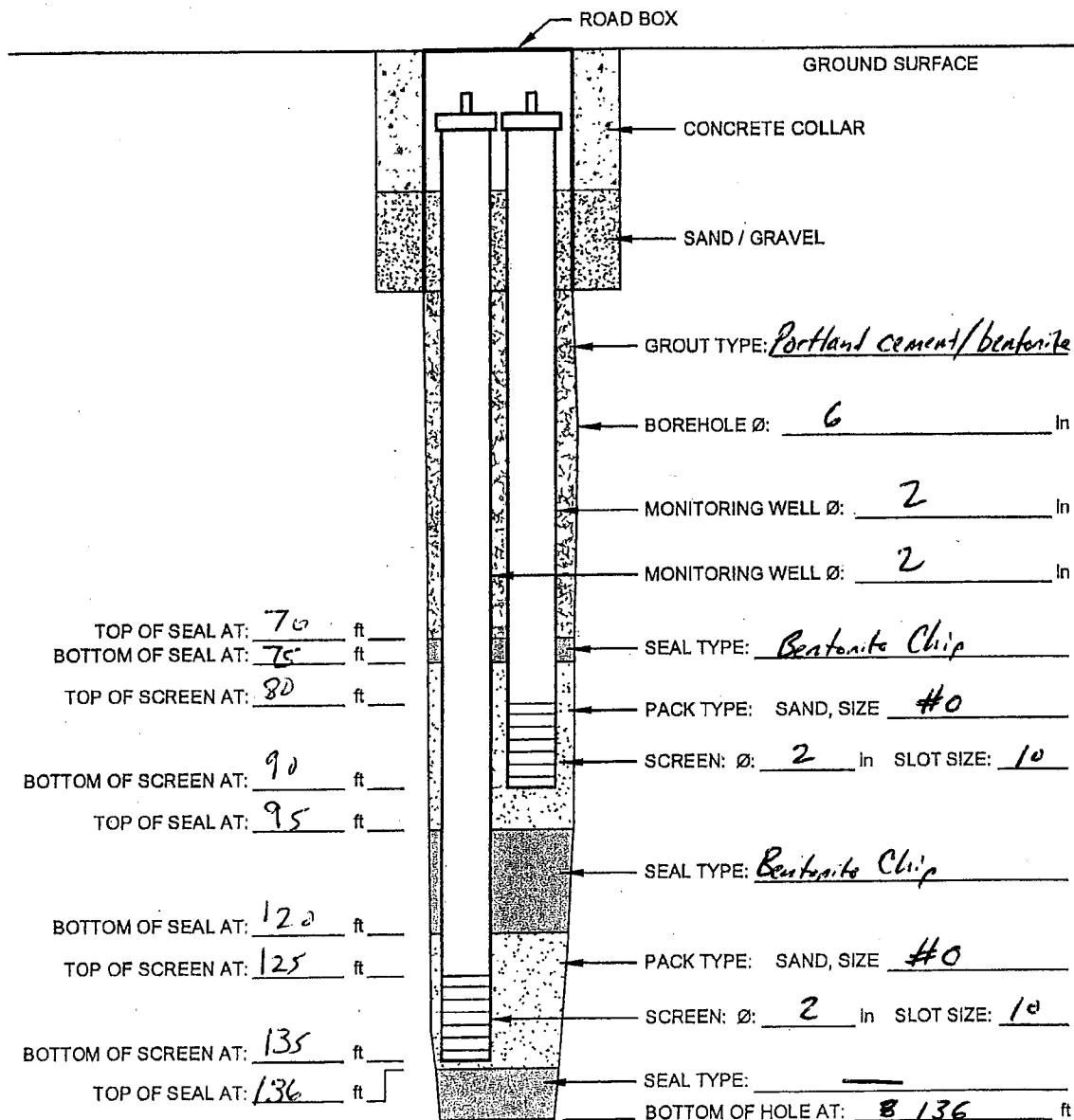
NOTES \_\_\_\_\_

NOTES AND COMMENTS \_\_\_\_\_



# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco HOLE DESIGNATION: MW-76 S/F  
 PROJECT No: 6883 DATE COMPLETED: 3/14/11  
 CLIENT: GSHZ DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 136' in

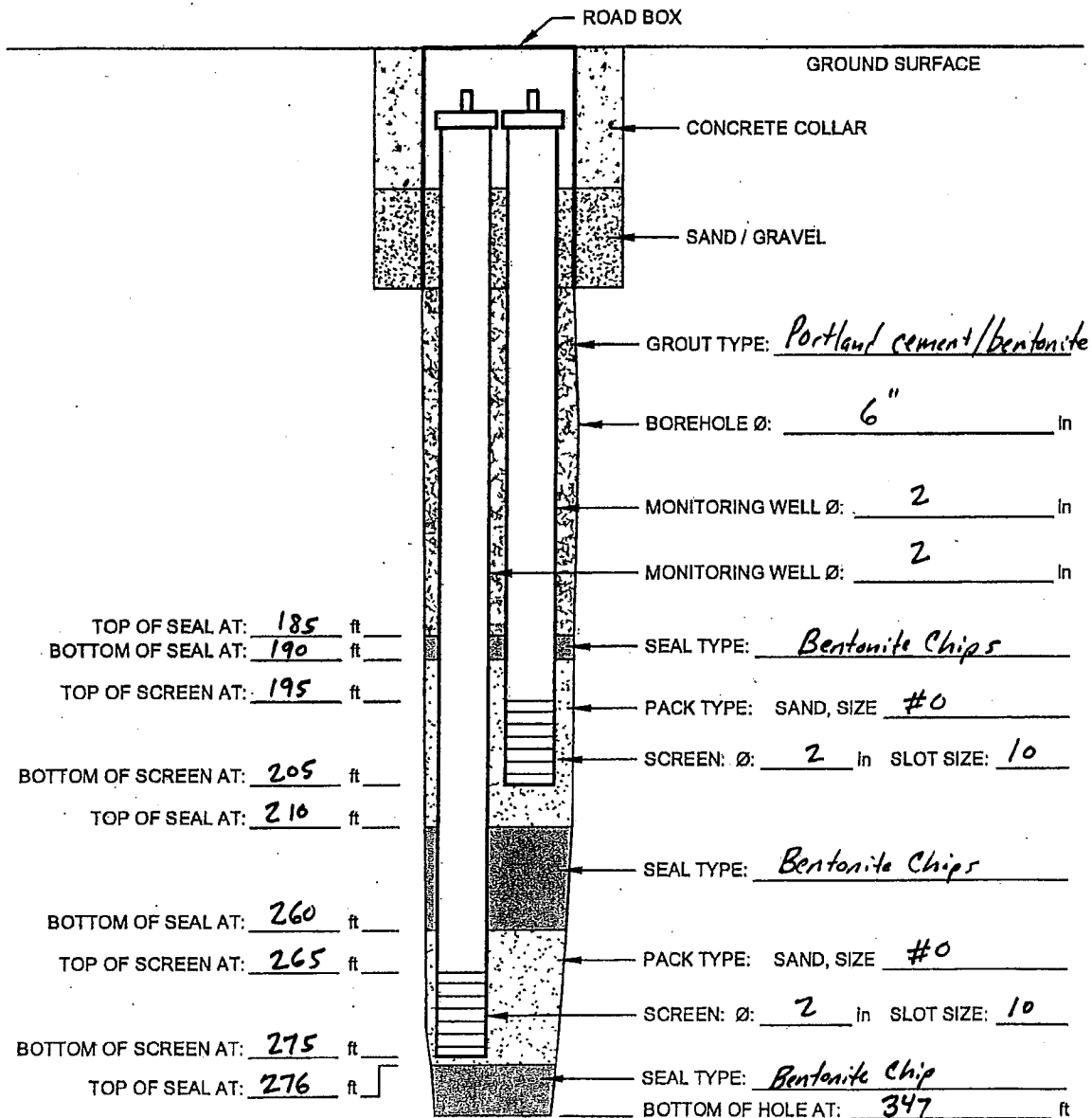
DEVELOPMENT: METHOD: Air lift DURATION: \_\_\_\_\_



# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHF  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: MW-76 D1/D2  
 DATE COMPLETED: 2/15/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" + 7" (347' + 207') in

DEVELOPMENT: METHOD: Airlift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 4

PROJECT NAME Hosker Run  
 PROJECT NUMBER 6883  
 CLIENT GSMT  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-77  
 DATE/TIME STARTED 2/22/11  
 DATE/TIME COMPLETED 2/24/11  
 DRILLING METHOD Sanic  
 CRA SUPERVISOR S. Dily

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	H A M M E R P E N E T R A T I O N Q D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
0		34	tan brown medium-coarse sand + gravel loose, some fines									0.0			
34		37	tan brown fine sand w/ some medium sand loose									0.0			
37		57	tan brown to light gray fine sand ± 0.50' firm									0.0			
57		77	tan brown fine sand, with silty and clayey lenses @ 60-65', firm									0.0			
77		95	tan brown + light gray fine sand, some silt firm									0.0			
95		97	light gray silty clay, stiff									0.0			
97		114	dark gray silty clay, stiff									0.0			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 4

PROJECT NAME Hicksville Ruco  
 PROJECT NUMBER 6883  
 CLIENT GSHD  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boett Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-77  
 DATE/TIME STARTED 2/22/11  
 DATE/TIME COMPLETED 2/24/11  
 DRILLING METHOD Surface  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft./m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L #	PENETRATION RECORD SPLIT SPOON BLOWE (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	8"	6"	8"	N	R				
114		117				tan brown fine-medium sand, slight odor, loose									
117		131	tan brown to light gray medium sand, some fine sand, loose, slight odor									0.4			
131		151	light gray medium sand, some fine sand + silt, loose									1.2			
151		177	SAME									0.7			
177		197	tan brown + light gray medium sand, loose, slight odor									0.8			
197		207	tan brown medium sand, loose									2.9			
207		210	tan brown fine sand + silt, firm, trace clay									0.7			
210		227	light brown fine-medium sand, some silt, firm									0.3			
227		245	light brown fine sand + silt, some clay, firm									0.6			
245		247	light gray fine-med sand, loose, odor									2.8			
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____												
			WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____												
			COMPLETION DETAILS: _____												
			NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.												
			NOTES: _____												



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 4

PROJECT NAME Hoker-Rucc  
 PROJECT NUMBER 6883  
 CLIENT G&P  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bornt-Langner  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-77  
 DATE/TIME STARTED \_\_\_\_\_  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD \_\_\_\_\_  
 CRA SUPERVISOR \_\_\_\_\_

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E L I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D  (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				8"	8"	8"	8"	N	R				
247		253	light brown fine sand + silt, firm									0.5			
			light												
253		267	tan brown medium sand, loose									1.7			
267		277	light brown medium sand, loose									2.7			
277		287	tan brown medium sand, loose, some fine sand + silt									9.7			
287		297	SAME									2.8			
297		307	tan brown medium sand, loose, some fine sand + silt									3.2			
307		324	light gray fine sand + silt, firm									1.2			
324		327	light gray fine-medium sand, loose									4.1			
327		335	light gray fine-medium sand, firm, some clay + silt									0.6			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



PAGE 4 OF 4

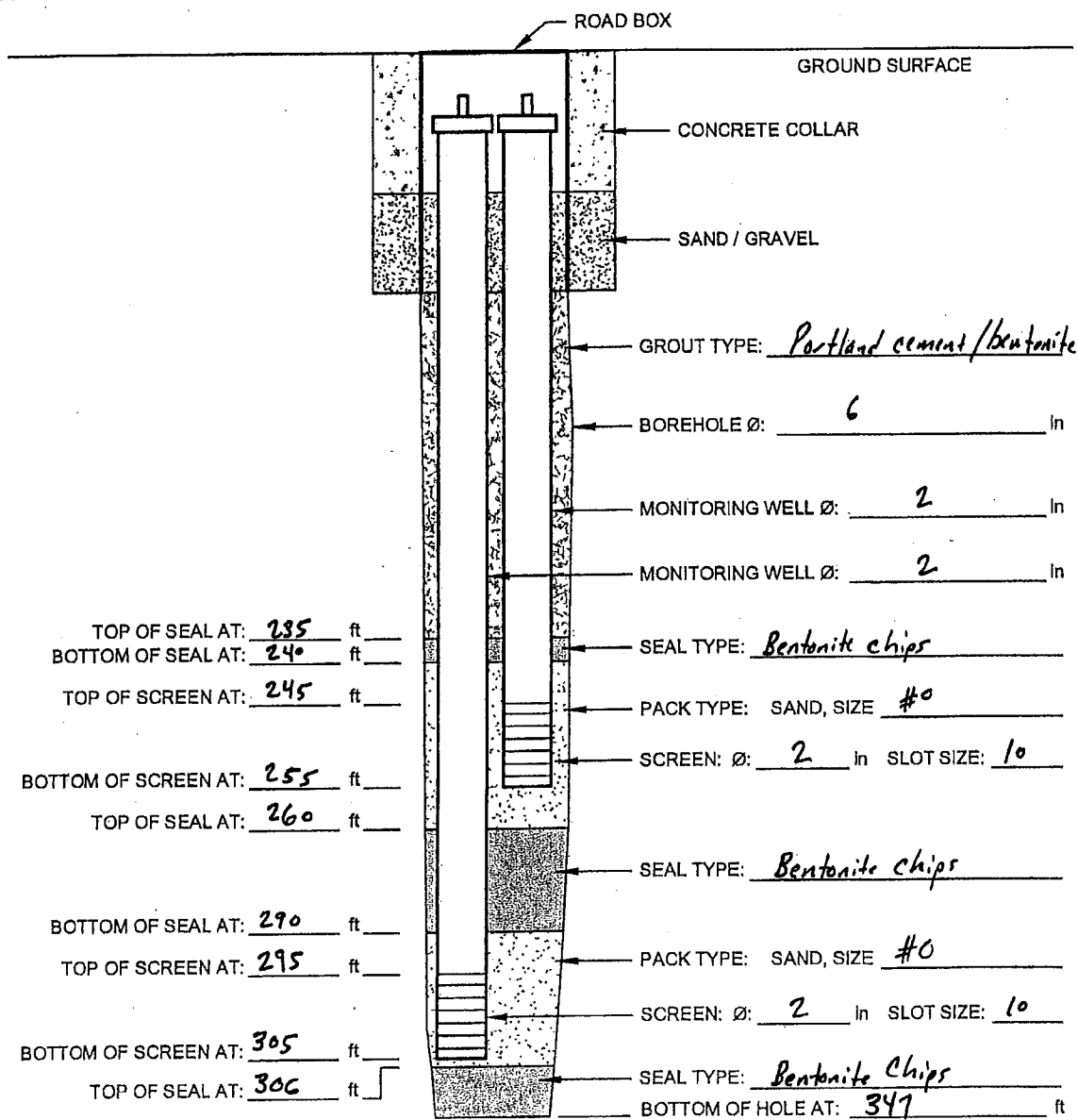
HOLE DESIGNATION MW-77  
DATE/TIME STARTED 3/23/11  
DATE/TIME COMPLETED 3/24/11  
DRILLING METHOD S.O.A.C.  
CRA SUPERVISOR S. Daulton



# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: MW-77  
 DATE COMPLETED: 2/26/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347' 7" to 257' in

DEVELOPMENT: METHOD: Air-lift DURATION: \_\_\_\_\_



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-81

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE	121.60						
5	topsoil SAND AND GRAVEL, some silt, light brown, medium coarse grained sand and gravel, no odour	120.60	CONCRETE	01				0.0
10			MW-81D1 TOP OF CASING 121.07 ft AMSL					0.0
15	SAND, medium grained, light brown, no odor	106.60	MW-81D2 TOP OF CASING 121.05 ft AMSL	02				0.0
20			CEMENT/ BENTONITE GROUT					0.0
25								
30	- fine-medium grained sand, tan brown, no odor at 29.0ft BGS		2" SCH 40 BLACK IRON RISER					
35				03				0.7
40								
45	- clay lens from 45.0 to 46.0ft BGS		2" SCH 80 PVC RISER					
50	SAND AND SILT, fine to medium grained sand, tan brown and light gray, orange mottles	72.60						0.0
55								
60	SAND, medium grained, light brown, no odor	63.60		04				0.0
65	CLAY, trace silt, stiff, dark gray	60.60						0.0
70								0.0
75	SAND, trace silt, medium grained sand, light brown and gray	47.60		05				0.6
80								
85								
	- fine medium grained sand, light brown and light							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

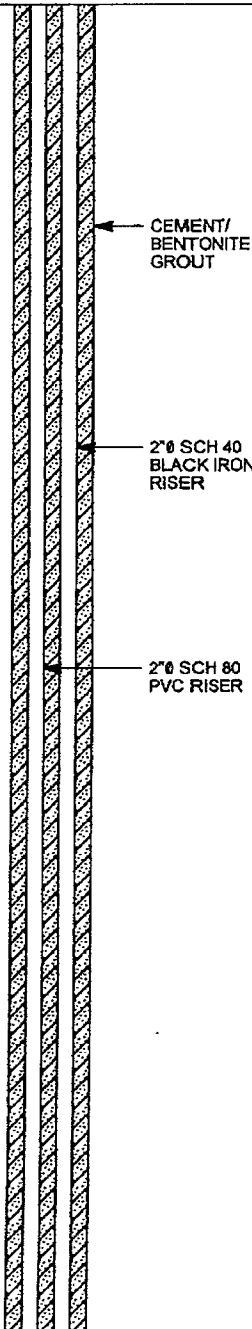
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-81

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE					
				NUMBER	INTERVAL	REC (%)	"N" VALUE	PID (ppm)	
95	gray sand, no odor at 89.0ft BGS			06				1.2	
100									
105									
110									
115									
120	SAND AND SILT, fine to medium grained sand, light brown and dark gray, no odor	-7.40		07				3.3	
125									
130	CLAY, trace silt, stiff, dark gray, no odor	-12.40		08				0.0	
135									
140									
145									
150									
155	SAND AND SILT, fine grained sand, tan brown light gray, sweet odor	-39.40		09				1.3	
160									
165									
170									
175				10				14.4	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-81

PROJECT NUMBER: 6883






DATE COMPLETED: November 2, 2005

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
185	- tan brown at 189.0ft BGS			11				26.8
190								
195								
200								
205	SAND, some silt, fine to medium grained sand, orange brown	-87.40		12				4.5
210								
215								
220	SILTY SAND, fine grained sand, tan brown, orange and light gray mottles	-107.40		13				20
225								
230								
235								
240	SILTY CLAY, stiff, dark gray	-124.40		14				3.8
245								
250	SAND AND SILT, trace clay, fine grained sand, light gray and light brown, sweet odor	-133.40		14				9.3
255								
260								
265								
		-147.40						17.2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-81

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
275	SAND, fine to medium grained sand, tan brown and light gray, orange mottles, sweet odor							
280				15				8.1
285								
290	SAND, trace silt, medium grained sand, light gray, sweet odor	-167.40		16				5.5
295								
300	- mixed light gray and tan brown, some fine grained sand, sweet odor at 300.0ft BGS							
305								
310				17				25.8
315								
320	SILTY SAND, some clay, fine grained sand, light gray, sweer odor	-197.40						
325								10.8
330				18				
335	SAND, trace silt, medium grained sand, light gray	-212.40						34.3
340	- slight sweet odor at 339.0ft BGS							
345								14.2
350	- with silt, medium to fine grained sand, gray and dark gray at 350.0ft BGS			19				
355								7.8
	SAND AND SILT, fine sand, gray	-236.40						6.5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.





LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-81

DATE COMPLETED: November 2, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
365	- fine to medium grained sand, light gray at 360.0ft BGS	-251.40		20				10.8
370								
375	SAND, firm, fine grained sand, light gray - loose at 375.0ft BGS							1.6
380		-278.40		21				12.7
385								
390								
395	- lens of clay, with silt from 395.0 to 397.0ft BGS							
400	SAND, some silt, fine medium grained sand, light gray, no odor							
405		-278.40		22				16.6
410								
415	- with silt, medium grained sand, light tan, dark gray silty mottles at 417.0ft BGS							
420								
425				23				16.8
430		-278.40						
435								
440	- some silt, fine to medium grained sand, reddish brown at 438.0ft BGS							
445	- silty clay lens, light brown, no odor from 442.0 to 444.0ft BGS			24				2.2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-81

PROJECT NUMBER: 6883

DATE COMPLETED: November 2, 2005

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	END OF BOREHOLE @ 450.0ft BGS	-328.40	<u>WELL DETAILS</u> Screened Interval: -183.40 to -193.40ft AMSL 305.00 to 315.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal: -165.40 to -178.40ft AMSL 287.00 to 300.00ft BGS Material: BENTONITE CHIPS Sand Pack: -178.40 to -197.40ft AMSL 300.00 to 319.00ft BGS Material: #1 SILICA SAND  Screened Interval: -283.40 to -293.40ft AMSL 405.00 to 415.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: STAINLESS STEEL Seal: -197.40 to -275.40ft AMSL 319.00 to 397.00ft BGS Material: BENTONITE CHIPS Sand Pack: -275.40 to -294.40ft AMSL 397.00 to 416.00ft BGS Material: #1 SILICA SAND					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-82

PROJECT NUMBER: 6883

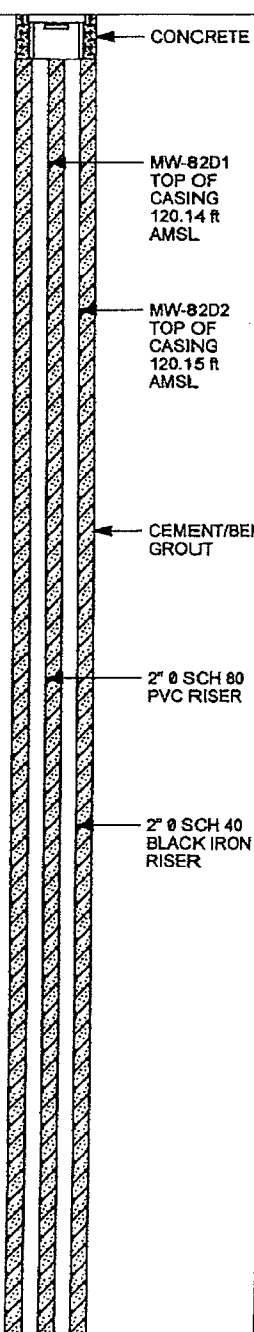
DATE COMPLETED: February 15, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE					
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)	
	GROUND SURFACE	120.50							
5	SAND AND GRAVEL, loose, medium to coarse, orange-brown			1				0.0	
10									
15									
20				2				0.3	
25	SAND, some gravel, loose, medium to coarse grained sand, tan brown	92.50							
30									
35									
40				3				0.0	
45								0.2	
50								0.0	
55									
60				4				0.1	
65									
70								0	
75	SILTY CLAY, firm, light gray	46.50						0	
	SAND, loose, medium grained, tan gray	44.50							
80				5					
85								0	
	- light gray at 88.0ft BGS								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/20/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-82

PROJECT NUMBER: 6883

DATE COMPLETED: February 15, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	P/D (ppm)
95				6				0.0
100								
105								
110	- tan brown and light gray at 108.0ft BGS							
115				7				0.3
120								
125	- light gray at 128.0ft BGS							
130								
135				8				0
140								
145	- orange brown at 144.0ft BGS							0
150	- fine to medium grained sand, light gray at 148.0ft BGS							
155				9				0.0
160								
165								
170								
175				10				0.6

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-82

PROJECT NUMBER: 6883

DATE COMPLETED: February 15, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
185	SILTY SAND, firm, fine to medium grained sand, tan brown	-59.50		11				0
	SILTY CLAY, stiff, dark gray	-65.50						0
190								
195								0
200				12				
205	SAND AND SILT, firm, fine to medium grained sand, tan brown and light gray	-84.50						0
	SILTY CLAY, stiff, dark gray	-87.50						0
210								
215	SAND AND SILT, firm, fine to medium grained sand, tan brown and light gray	-92.50						0
220				13				
225	CLAY AND SILT, stiff, light gray	-104.50						0
	SILT AND SAND, firm, fine grained sand, tan brown, sweet odor	-107.50						0.6
230								
235				14				
240	SILTY CLAY, firm, dark gray	-117.50						0.6
245								
250	SAND, loose, medium grained, tan brown, no odor	-127.50						0.0
255								
260								
265								
	- fine to medium grained sand, tan brown, some orange brown and light gray mottles, no odor at							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-82

DATE COMPLETED: February 15, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
268.0ft BGS								
275				15				1.5
280			CEMENT/BENTONITE GROUT					
285								
290	- medium grained sand, tan brown at 288.0ft BGS		2" Ø SCH 80 PVC RISER					0
295		-175.50		16				0
300	SILTY CLAY, firm, light gray		2" Ø SCH 40 BLACK IRON RISER					0
305	SAND, loose, fine to medium grained sand, tan brown and reddish brown, sweet odor	-179.50						6.1
310								
315	- light gray and tan brown at 317.0ft BGS							11.2
320				17				7.8
325								
330								0
335	SILTY CLAY, stiff, dark gray	-213.50	BENTONITE CHIPS					7.2
340	SAND, loose, fine to medium grained, orange brown	-217.50						
345			SAND PACK					
350	- medium grained sand, gray and olive-brown to tan brown, sweet odor at 350.0ft BGS		MW-82-D1 SCH 80 PVC WELL SCREEN					
355								154

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-82

PROJECT NUMBER: 6883

DATE COMPLETED: February 15, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
365								
370	SAND AND SILT, loose, fine to medium grained sand, tan brown and light gray, sweet odor	-246.50						11.2
375				18				
380	- tan brown and red-gray at 378.0ft BGS		BENTONITE CHIPS					
385	- clay lens from 385.0 to 388.0ft BGS							48.9
390	SAND, loose, medium to coarse grained, reddish brown, sweet odor	-268.50	2" Ø SCH 40 BLACK IRON RISER					41.5
395								
400								
405								
410	- clay lens from 408.0 to 412.0ft BGS		SAND PACK					43.2
415			MW-82-D2 STAINLESS STEEL WELL SCREEN					
420	- medium grained, red brown to light pink, no odor at 420.0ft BGS			19				
425								
430								
435			BENTONITE CHIPS					4
440								
445								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-82

PROJECT NUMBER: 6883

DATE COMPLETED: February 15, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
	END OF BOREHOLE @ 450.0ft BGS	-329.50	<u>WELL DETAILS</u> Screened Interval: -184.50 to -194.50ft AMSL 305.00 to 315.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal: -169.50 to -179.50ft AMSL 290.00 to 300.00ft BGS Material: BENTONITE CHIPS Sand Pack: -179.50 to -199.50ft AMSL 300.00 to 320.00ft BGS Material: #1 SILICA SAND  Screened Interval: -284.50 to -294.50ft AMSL 405.00 to 415.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: STAINLESS STEEL Seal: -269.50 to -279.50ft AMSL 390.00 to 400.00ft BGS Material: BENTONITE CHIPS Sand Pack: -279.50 to -299.50ft AMSL 400.00 to 420.00ft BGS Material: #1 SILICA SAND					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-83

DATE COMPLETED: October 7, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE	121.58						
5	SILTY SAND, trace gravel, light brown, no odor		CONCRETE	01				0.0
10	SAND AND GRAVEL, medium to coarse sand, fine gravel, dry, light brown and red brown, no odor	115.58	MW-83D1 TOP OF CASING 120.99 ft AMSL	02				0.0
15			MW-83D2 TOP OF CASING 121.02 ft AMSL					
20	SAND, trace silt, medium grained sand, light brown, moist, no odor	105.58	CEMENT/ BENTONITE GROUT	03				0.7
25	- trace gravel at 26.0ft BGS							
30			2" Ø SCH 80 PVC RISER	04				1.2
35								
40	CLAY, trace silt, stiff, dark brown	85.58		05				0.0
45			2" Ø SCH 80 PVC RISER					
50	SAND, fine grained, light brown, moist, no odor	75.58		06				0.0
55								
60	CLAY, high plasticity, dark gray, wet, no odor	65.58		07				0.0
65	SAND, medium grained, tan brown, moist, no odor	60.58						0.0
70	- fine to medium grained sand, wet at 66.0ft BGS			08				0.0
75								
80	- light gray, clean, saturated at 76.0ft BGS			09				0.0
85								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 12/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-83

DATE COMPLETED: October 7, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	P/D (ppm)
95	- gray at 96.0ft BGS			10				0.0
100				11				0.0
105	- trace coarse sand, gray and brown at 106.0ft BGS		CEMENT/ BENTONITE GROUT					
110	- clay lens from 112.0 to 114.0ft BGS			12				0.0
115	- light brown, saturated at 116.0ft BGS							
120			2" Ø SCH 80 PVC RISER	13				0.0
125	- medium grained sand, light brown and orangish brown at 126.0ft BGS							
130				14				0.0
135	CLAY, stiff, dark gray, no odor	-14.42	2" Ø SCH 80 PVC RISER					
140				15				0.0
145	- trace silt at 146.0ft BGS							
150				16				0.0
155	SAND, loose, fine to medium grained, light gray and orangish brown, no odor	-34.42						
160				17				0.0
165	- light brown and light gray at 166.0ft BGS							
170				18				0.0
175								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-83

DATE COMPLETED: October 7, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
185	- slight sweet odor at 186.0ft BGS			19				0.0
190				20				3.3
195	- light brown, sweet odor at 196.0ft BGS							
200				21				0.5
205	- light gray and orangish brown, thin clay lenses, no odor at 206.0ft BGS							
210				22				0.0
215	- loose, orange brown at 216.0ft BGS							
220				23				0.0
225	- trace clay at 226.0ft BGS							0.0
230	SILTY CLAY, light brown and gray	-108.42						0.0
235	- light gray at 236.0ft BGS			24				0.0
240								0.0
245								
250	SAND, trace silt and clay, stiff, fine to medium grained sand, low plasticity, slight sweet odor, light gray orangish brown	-124.42						
255				25				0.0
260								
265	- tan brown, sweet odor at 266.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-83

DATE COMPLETED: October 7, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
275								4.3
	CLAY, light gray, no odor	-155.42	CEMENT/ BENTONITE GROUT	26				0.0
280	SAND, fine grained, light brown, orange mottles, no odor	-158.42						0.9
285	- medium grained sand, light brown, sweet odor at 286.0ft BGS							
290								
295				27				0.0
300	- loose, gray at 300.0ft BGS		BENTONITE CHIP SEAL					
305								
310			MW-83D1 WELL SCREEN	28				3.2
315	- tan brown, slight odor at 316.0ft BGS		SAND PACK					
320								
325				29				0.2
330			2" Ø SCH 80 PVC RISER					
335	- fine to medium grained sand, trace clay and silt, brownish gray, no odor at 336.0ft BGS							
340				30				3.1
345								
350	- loose, medium sand, gray, slight odor at 350.0ft BGS							
355			BENTONITE CHIP SEAL	31				14.8
	CLAY, trace sand and silt, stiff, fine grained sand, dark gray	-235.42						

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.


LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-83

DATE COMPLETED: October 7, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
365	SAND, loose, medium grained, tan brown	-244.42		32				0.0
370	CLAYEY SAND, trace silt, firm, light gray	-248.42						5.5
375				33				0.5
380	SAND AND SILT, fine grained sand, light gray	-256.42						0.0
385	- firm, sweet odor at 386.0ft BGS							
390								
395				34				15.8
400	SILTY CLAY, firm, light gray	-279.42						0.0
405	SAND, fine to medium grained, light brown and light gray	-284.42		35				0.3
410								
415	- loose, medium grained, light brown, trace gray at 416.0ft BGS							15.8
420								
425	- fine to medium grained, reddish brown, no odor at 425.0ft BGS			36				14.7
430								
435								0.3
440				37				0.0
445	- light brown and gray at 445.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-83

DATE COMPLETED: October 7, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
	END OF BOREHOLE @ 450.0ft BGS	-328.42	<b>WELL DETAILS</b> Screened interval: -183.42 to -193.42ft AMSL 305.00 to 315.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal: -172.42 to -178.42ft AMSL 294.00 to 300.00ft BGS Material: BENTONITE CHIPS Sand Pack: -178.42 to -199.42ft AMSL 300.00 to 321.00ft BGS Material: #1 SILICA SAND  Screened interval: -268.42 to -278.42ft AMSL 390.00 to 400.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal: -199.42 to -263.42ft AMSL 321.00 to 385.00ft BGS Material: BENTONITE CHIPS Sand Pack: -263.42 to -279.42ft AMSL 385.00 to 401.00ft BGS Material: #1 SILICA SAND					
455								
460								
465								
470								
475								
480								
485								
490								
495								
500								
505								
510								
515								
520								
525								
530								
535								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-84

PROJECT NUMBER: 6883

DATE COMPLETED: May 2, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
	GROUND SURFACE	121.34						
	TOPSOIL	121.17						
5	SAND AND GRAVEL, some silt, loose, fine to medium grained sand, orange-brown, no odor		CONCRETE					
10			MW-84D1 TOP OF CASING 120.80 ft AMSL					
15			MW-84D2 TOP OF CASING 120.94 ft AMSL					
20			CEMENT/ BENTONITE GROUT					
25								
30	SAND AND SILT, trace clay, firm, fine grained, light gray and orange	93.34	2" SCH 40 BLACK IRON RISER					
35								
40	- loose, tan brown, no odor at 38.0ft BGS							
45			2" SCH 80 PVC RISER					
50								
55								
60	SAND, loose, medium grained, tan brown and grayish brown	63.34						
65								
70	SILTY CLAY, stiff, light gray - dark gray at 67.0ft BGS	56.34						
75								
80	SAND, loose, medium grained, tan brown - fine to medium grained sand, light tan, no odor at 78.0ft BGS	45.34						
85								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MWV-84

DATE COMPLETED: May 2, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
95								
100								
105								
110								
115								
120	- medium grained sand, tan brown at 118.0ft BGS							
125	SILTY CLAY, compact, dark gray, no odor	-3.66						
130								
135								
140	- stiff at 138.0ft BGS							
145								
150								
155	SAND AND SILT, loose, fine to medium grained, light gray	-30.66						
160								
165	SAND, loose, fine to medium grained, tan brown	-42.66						
170								
175								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-84

DATE COMPLETED: May 2, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
185								
190	CLAY, trace silt, light brown	-88.66	CEMENT/ BENTONITE GROUT					
195								
200	SAND AND SILT, trace clay, firm, fine grained, light brown	-76.66						
205			2" SCH 40 BLACK IRON RISER					
210	SAND, loose, fine to medium grained, light brown	-88.66						
215	- tan brown at 218.0ft BGS							
220			2" SCH 80 PVC RISER					
225								
230	SILTY CLAY, stiff, dark gray	-108.66						
235	- no odor at 238.0ft BGS							
240								
245	SAND AND SILT, trace clay, firm, fine grained sand, tan brown and light gray	-124.66						
250								
255								
260	SAND, loose, medium grained, tan brown, sweet odor	-136.66						
265								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-84

DATE COMPLETED: May 2, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
275								
280								
285	SAND AND SILT, firm, fine grained sand, light gray and orange, sweet odor	-163.66						
290								
295	SAND, loose, fine grained, light gray, sweet odor	-173.66						
300	- trace silt, firm, fine to medium grained sand, light gray, sweet odor at 300.0ft BGS							
305								
310								
315								
320	SAND AND SILT, firm, fine grained sand, gray, sweet odor	-196.66						
325								
330								
335	SAND, loose, fine to medium grained, light gray, sweet odor - medium grained, tan brown, sweet odor at 338.0ft BGS	-212.66						
340								
345								
350								
355								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

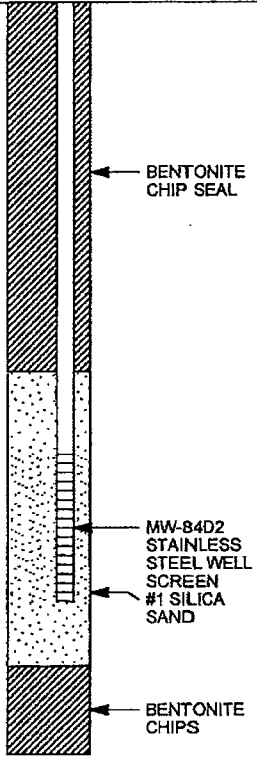
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-84

DATE COMPLETED: May 2, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
365	- clay lens from 363.0 to 364.0ft BGS - SAND AND SILT, trace clay, firm, fine grained sand, gray from 366.0 to 377.0ft BGS	-244.66						
370	- no odor at 372.0ft BGS							
375								
380	SAND, loose, medium grained, tan brown, sweet odor							
385								
390								
395								
400	- fine to medium grained, light gray, no odor at 400.0ft BGS							
405								
410	END OF BOREHOLE @ 411.0ft BGS	-289.66						
415	STRATIGRAPHY OF MW-84 FROM IW-18		<b>WELL DETAILS</b> Screened interval: -223.66 to -233.66ft AMSL 345.00 to 355.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal: -204.46 to -214.26ft AMSL 325.80 to 335.60ft BGS Material: BENTONITE CHIPS Sand Pack: -214.26 to -236.66ft AMSL 335.60 to 358.00ft BGS Material: #1 SILICA SAND  Screened interval: -269.26 to -279.26ft AMSL 390.60 to 400.60ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal:					
420								
425								
430								
435								
440								
445								

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-84

PROJECT NUMBER: 6883

DATE COMPLETED: May 2, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
455			-236.66 to -281.26ft AMSL 358.00 to 382.60ft BGS Material: BENTONITE CHIPS Sand Pack: -261.26 to -283.66ft AMSL 382.60 to 405.00ft BGS Material: #1 SILICA SAND					
460								
465								
470								
475								
480								
485								
490								
495								
500								
505								
510								
515								
520								
525								
530								
535								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 5

PROJECT NAME Hocker Rucc  
 PROJECT NUMBER 6883  
 CLIENT GSHI  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
 DRILLER G. Deley  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-85  
 DATE/TIME STARTED 11/16/10  
 DATE/TIME COMPLETED 11/21/10  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/in BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L #	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
0		37				tan brown med sand with coarse sand and gravel, some fine sand and silt, loose									
37		57	reddish brown to light gray med sand loose WATER AT 50'									0.0			
57		67	light gray medium sand, some fine sand and silt, loose									0.0			
67		77	light brown to light gray medium sand loose									0.1			
77		87	light gray medium sand, some fine sand + silt, clay layer 72-73'									0.0			
87		97	light gray medium sand, loose, clay lens at 95-96'									0.0			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 5

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER \_\_\_\_\_  
 CLIENT \_\_\_\_\_  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR \_\_\_\_\_  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION \_\_\_\_\_  
 DATE/TIME STARTED \_\_\_\_\_  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD \_\_\_\_\_  
 CRA SUPERVISOR \_\_\_\_\_

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E T H I C K N E S S	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S I N T E R V A L	P I D F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
97		117	light gray medium sand, loose clay layers at 97-99', 104-105'									0.0			
117		127	light gray medium sand, loose									0.0			
127		137	tan brown fine sand & silt, firm, thin clay lenses throughout									0.0			
137		150	light gray med sand, loose									0.0			
150		157	tan brown & light gray medium sand									0.1			
157		177	light gray fine-medium sand, loose									0.2			
177		182	light gray fine-medium sand, loose									0.1			
182		187	tan brown & light gray fine sand & silt, same medium sand, firm									0.0			
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____												





## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 5

PROJECT NAME Hooder-Ruco  
 PROJECT NUMBER \_\_\_\_\_  
 CLIENT \_\_\_\_\_  
 LOCATION \_\_\_\_\_

DRILLING CONTRACTOR \_\_\_\_\_  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-85  
 DATE/TIME STARTED \_\_\_\_\_  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD \_\_\_\_\_  
 CRA SUPERVISOR \_\_\_\_\_

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E T H I C K N E S S	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E S I Z E	I N T E R V A L	P I D I D (ppm)	C H E M I C A L	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R					
187		197	tan brown + light gray fine sand + silt firm, some medium sand, clay layer at 193-195'										0.0			
197		210	tan brown fine sand + silt, clay lenses, firm										0.0			
210		214	dark gray/black silty clay, stiff										0.0			
214		217	tan brown fine sand + silt, clay lenses, firm										0.1			
217		232	tan brown fine - medium sand, some silt, loose										0.3			
232		235	light gray clay, stiff										0.1			
235		237	tan brown fine sand + silt + firm										0.5			
237		257	tan brown fine sand + silt + some clay 240-245 firm										0.0			
257		265	tan brown fine sand + silt, some clay lenses firm										0.1			

NOTES  
AND  
COMMENTS

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 4 OF 5

PROJECT NAME Hooker Run  
 PROJECT NUMBER \_\_\_\_\_  
 CLIENT \_\_\_\_\_  
 LOCATION Hicksville, NY

DRIILLING CONTRACTOR \_\_\_\_\_  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-85  
 DATE/TIME STARTED \_\_\_\_\_  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD \_\_\_\_\_  
 CRA SUPERVISOR \_\_\_\_\_

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M M P L E T H I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D I D (ppm)	C H E M I C A L	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R				
265		277				light gray fine sand + silt, firm									
277		287	tan brown fine-med sand, some silt, loose slight sweet odor									3.6			
287		289	tan brown fine-med sand + silt, loose, odor									2.6			
289		297	dark gray/black silty clay, stiff									0.0			
297		309	dark gray/black silty clay, stiff									0.0			
309		317	tan brown + reddish brown medium sand loose, odor									0.8 3.3			
317		323	tan brown medium sand, loose, odor									3.8			
323		330	light gray fine sand + silt, some clay, firm sweet odor									4.5			
330		337	light gray medium sand, loose, sweet odor									6.8			
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____												



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 5 OF 5

PROJECT NAME Hooker Ruco  
 PROJECT NUMBER \_\_\_\_\_  
 CLIENT \_\_\_\_\_  
 LOCATION \_\_\_\_\_

DRELLING CONTRACTOR \_\_\_\_\_  
 DRELLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-85  
 DATE/TIME STARTED \_\_\_\_\_  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRELLING METHOD \_\_\_\_\_  
 CRA SUPERVISOR \_\_\_\_\_

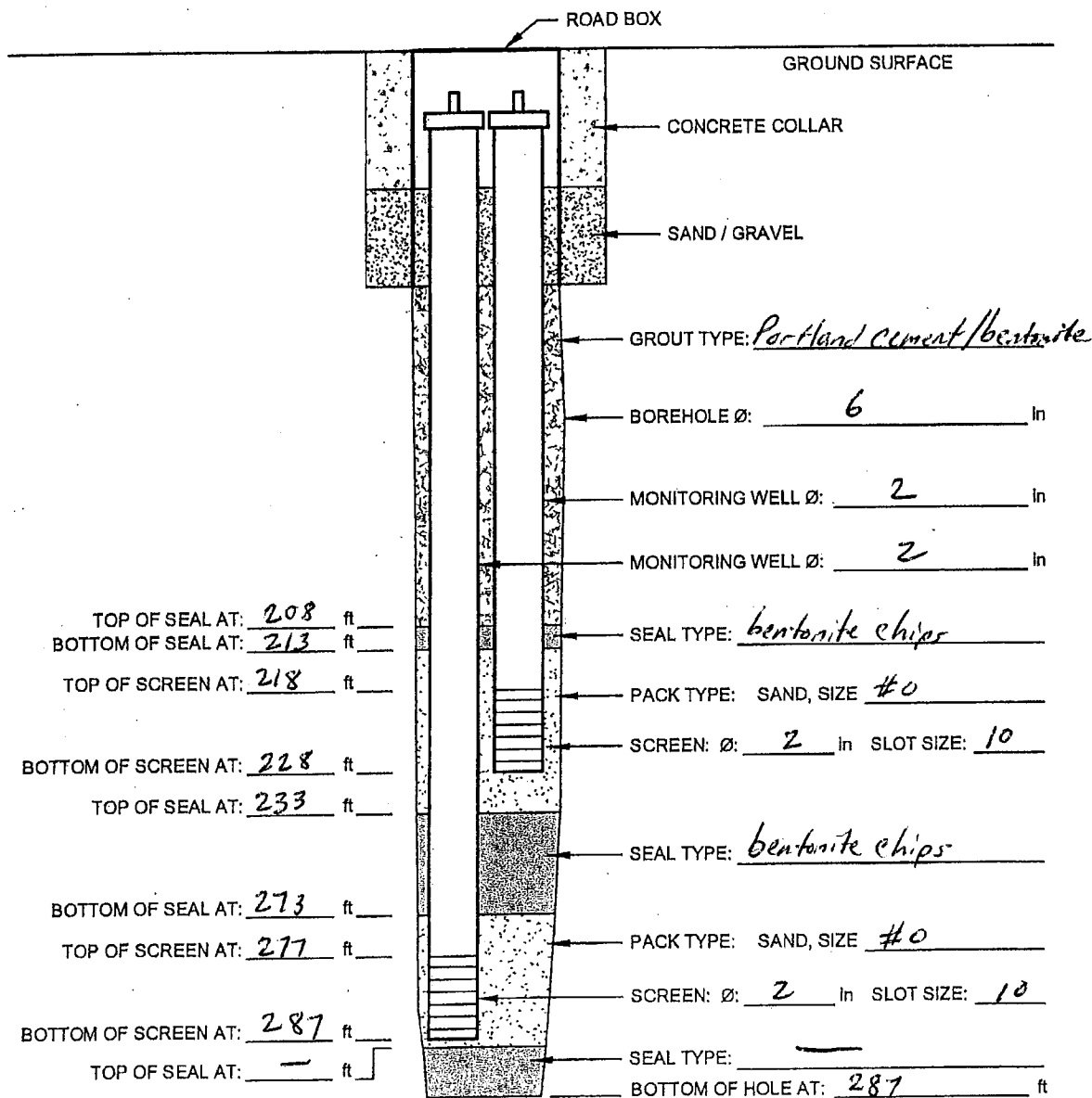
STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E T H I C K N E S S	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R					
337		348	tan brown to reddish brown medium sand loose, odor									3.0				
348		358	tan brown medium sand, loose, odor									6.6				
358		364	tan brown to reddish brown medium sand, loose									2.8				
364		368	light gray fine sand & silt, firm, odor									3.4				
368		375	reddish brown medium sand, loose, odor									6.0				
375		398	light gray fine sand & silt, firm, odor									7.6				
398		407	light gray medium sand, loose, odor									2.4				
	407		END OF BORING													
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____, AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____													



# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHF  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: MW-85 (S+I)  
 DATE COMPLETED: 12/4/10  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

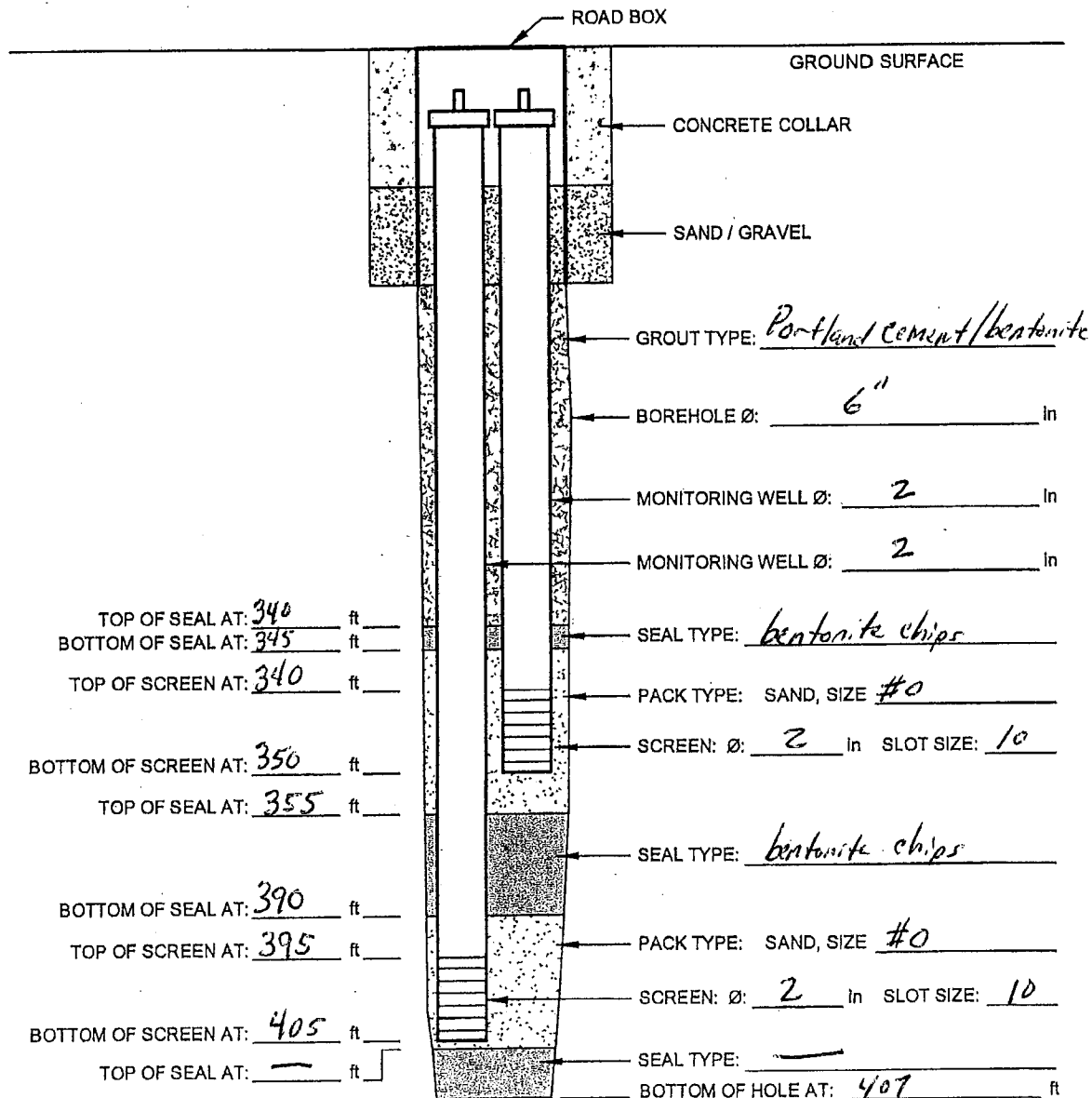
SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 287' 7" to 228' in

DEVELOPMENT: METHOD: Art. Eff DURATION: 4 hrs + 2.5 hrs (750 gals each)

# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco HOLE DESIGNATION: MW-85 (D1 + D2)  
 PROJECT No: 6883 DATE COMPLETED: 12/2/10  
 CLIENT: GSITF DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 407' 7" to 350' in

DEVELOPMENT: METHOD: Airlift DURATION: D1 1.25 + 2 hrs (750 + 500 gals) D2

## STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Houker Road  
 PROJECT NUMBER 6883  
 CLIENT CSHC  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boat & Langdon  
 DRILLER G. Sealey  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

PAGE 1 OF 5  
 HOLE DESIGNATION IW-14 (W-86)  
 DATE/TIME STARTED 11/4/10  
 DATE/TIME COMPLETED 11/8/10  
 DRILLING METHOD Sanic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										CHEMICAL ANALYSIS	GRAIN SIZE
FROM	TO	AT	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						INTERVAL	P/F/D (ppm)		
						6"	6"	6"	6"	N	R				
0	37		tan brown medium-coarse sand + gravel some fine sand + silt, loose										0.0		
37	57		tan brown fine-medium sand + silt, firm										0.0		
57	77		tan brown med sand, some fine sand + silt, loose										0.0		
77	92		tan brown medium-coarse sand, loose										0.0		
92	97		tan brown + light gray fine sand, firm										0.0		
97	117		tan brown + light gray fine sand + silt, firm thin clay lenses										0.0		
117	137		light gray fine sand, loose										0.0		
137	157		light gray med sand, loose										0.2		
157	165		light gray fine sand + silt, firm										0.3		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 5

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6583  
 CLIENT GSHF  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
 DRILLER G. Sealey  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-14 (MW-06)  
 DATE/TIME STARTED 11/4/10  
 DATE/TIME COMPLETED 11/8/10  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN M/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS  NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E I N T E R V A L #	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
165		177	light gray + tan brown medium sand, loose sweet odor										2.5		
177		197	tan brown + light gray medium sand, loose sweet odor										1.8		
197		217	tan brown fine-medium sand + silt, firm										0.2		
217		237	tan brown medium sand, loose, clay lenses at 224-230, sweet odor										5.6		
237		247	tan brown fine sand + silt, clay lenses, firm sweet odor										4.4		
247		267	tan brown + light gray fine-medium sand sweet odor, loose										8.5		
267		277	tan brown medium sand w/ fine sand + silt loose										1.2		
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____												



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 5

PROJECT NAME Hopko - Reno  
 PROJECT NUMBER 6583  
 CLIENT GSI  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Looze  
 DRILLER G. Sealey  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION IW-14 (MW-66)  
 DATE/TIME STARTED 11/4/10  
 DATE/TIME COMPLETED 11/8/10  
 DRILLING METHOD Swiss  
 CRA SUPERVISOR S. Kelly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/in BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E I N T E R V A L #	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I P E D (ppm)	C H E M I C A L	G R A I N S I Z E	
F R O M	A T	T O				ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
							6"	8"	6"	6"	N					R
277		283	tan brown fine sand + silt w/ clay lenses stiff										0.0			
283		287	light gray medium sand, loose										0.2			
287		297	light gray medium sand, loose										0.1			
297		300	light gray medium sand, loose										0.0			
300		307	dark gray/black silty clay, very stiff										0.0			
307		327	light gray fine sand + silt, firm thin layers of med sand										1.2			
327		343	light gray fine sand + silt, firm clay lenses at 330-335										3.3			
343		347	light gray medium sand, some fine sand + silt loose										1.2			

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_







## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 5 OF 5

PROJECT NAME Hanker Ruco  
 PROJECT NUMBER 6887  
 CLIENT GSHE  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longyear  
 DRILLER Gerald Sealy  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

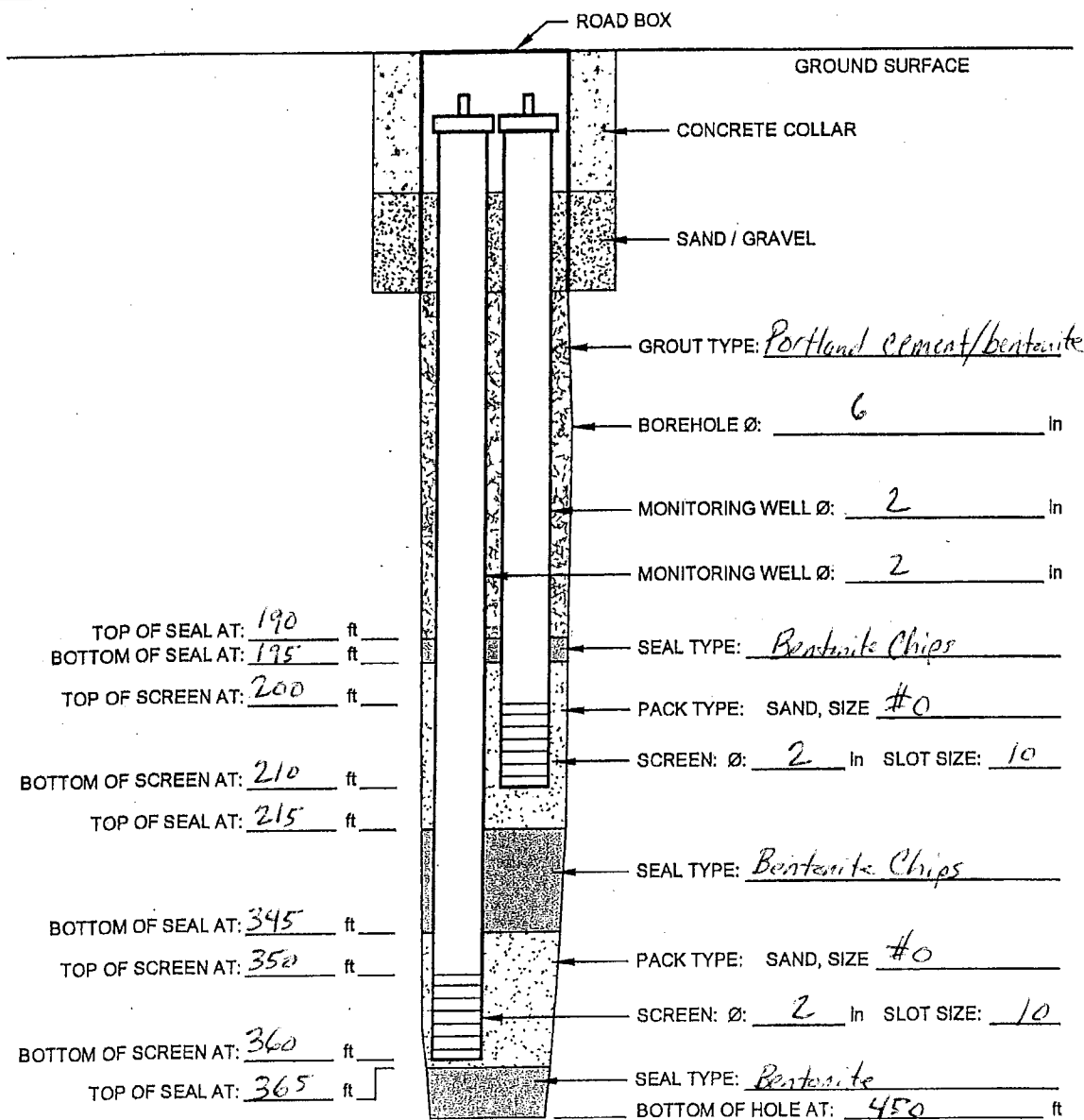
HOLE DESIGNATION TW-14 (MW-66)  
 DATE/TIME STARTED 11/4/10  
 DATE/TIME COMPLETED 11/5/10  
 DRILLING METHOD manic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										S A M P L E #	S A M P L E I N T E R V A L	P I D P I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E I N T E R V A L									
				6"	6"	6"	6"	N	R										
397		408	tan brown medium sand, loose																
408		418	light gray fine-medium sand + silt, loose																
408		428	light gray fine-medium sand + silt, loose																
428		438	tan brown medium sand, loose																
438		441	tan brown + light gray silty clay w/ fine sand, firm																
441		450	light gray fine sand + silt, firm																
		450	END OF BORING																
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____																
			WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____																
			COMPLETION DETAILS: _____																
			NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.																



# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hucker Ruco HOLE DESIGNATION: MW-86  
 PROJECT No: 6883 DATE COMPLETED: 11/11/10  
 CLIENT: GSHI DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 450' 7" to 290 in

DEVELOPMENT: METHOD: Air lift DURATION: \_\_\_\_\_



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-87

DATE COMPLETED: October 4, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE	121.05						
	SILTY SAND, trace gravel, light brown, no odor		CONCRETE					
5	SAND AND GRAVEL, trace silt, fine to medium grained sand, medium to coarse grained gravel, light brown, dry, no odor	116.05	MW-87D1 TOP OF CASING 120.55 ft AMSL	01				0.0
10	- no silt, medium to coarse grained sand, medium to very coarse grained gravel at 7.0ft BGS		MW-87D2 TOP OF CASING 120.55 ft AMSL					
15	- trace silt, orange-brown at 17.0ft BGS		CEMENT/ BENTONITE GROUT	02				0.0
20								
25	SAND, trace silt, trace gravel, medium grained sand, medium to very coarse gravel, light brown, dry, no odor	97.05	2" Ø SCH 80 PVC RISER	03				0.0
30	- no silt, medium to coarse grained gravel, light brown and orangish brown at 27.0ft BGS							
35								
40	SAND AND SILT, fine grained, reddish brown, moist, no odor	84.05		04				0.0
45	- light gray clay lens from 38.0 to 39.0ft BGS							
50			2" Ø SCH 80 PVC RISER	05				0.0
55	SAND, fine to medium grained, light brown, gray areas, moist, no odor	74.05						
60								
65	CLAY, high plasticity, brownish gray and dark brown, moist	64.05		06				0.0
70								
75	SW - SAND, fine to medium grained, light brown, orange mottles, moist, no odor	58.05		07				0.0
80	- wet at 67.0ft BGS							
85								
	- medium grained, stratified, light brown and gray at 77.0ft BGS			08				0.0
	- fine to medium grained, orangish brown, saturated at 87.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-87

DATE COMPLETED: October 4, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
95	- light gray at 97.0ft BGS			09				0.0
100				10				0.0
105	- medium to coarse grained, stratified, light gray and light brown at 107.0ft BGS		CEMENT/ BENTONITE GROUT	11				0.0
110				12				0.0
115			2" Ø SCH 80 PVC RISER	13				0.0
120				14				0.0
125	- trace silt, fine to medium grained, medium dark brown at 127.0ft BGS			15				0.0
130				16				0.0
135	CH - CLAY, stiff, dark gray, no odor	-11.95	2" Ø SCH 80 PVC RISER	17				0.0
140								
145								
150	SC - CLAYEY SAND, light gray orange, no odor	-25.95						
155								
160	SW - SAND, medium grained sand, gray and light brown, no odor	-35.95						
165								
170	- loose, stratified, light brown and gray layers, no odor at 167.0ft BGS							
175								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-87

DATE COMPLETED: October 4, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
185				18				0.0
190	light gray and orangish brown, thin clay lenses, no odor	-65.95	CEMENT/ BENTONITE GROUT	19				0.0
195								
200	SW - SAND, fine to medium grained, stratified, orange brown and light gray, no odor	-75.95		20				0.0
205			2" Ø SCH 80 PVC RISER					
210								
215				21				0.0
220			2" Ø SCH 80 PVC RISER					
225								
230	SM - SILTY SAND, trace clay, firm, tan brown, no odor	-105.95						0.0
235	CH - CLAY, trace silt, stiff, dark gray	-109.95						0.0
240	SW - SAND, loose, fine to medium grained, orange brown	-114.95		22				0.0
245	SC - CLAYEY SILT AND SAND, light gray and orange, no odor	-119.95						0.0
250	SM - SAND AND SILT, loose, fine to medium grained sand, tan brown to light gray, orange mottles	-126.95						
255				23				0.0
260								
265	SC - SAND, some clay, fine grained sand, orange brown and light gray, sweet odor	-143.95						0.1
	SW - SAND, fine to medium grained, light gray,	-146.95						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GOT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-87

DATE COMPLETED: October 4, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
275	orange mottles, sweet odor							8.3
280	CH - CLAY, stiff, dark gray, no odor	-156.95		24				0.0
285	SC - SAND, with clay, fine to medium grained sand, thin clay layers throughout, light gray, sweet odor	-158.95						1.2
290	SW - SAND, trace clay, fine to medium grained sand, light gray, orange mottles, sweet odor	-166.95		25				5.9
300	- medium to coarse grained sand, light brown, no odor at 300.0ft BGS							4.2
305								
310	- fine to medium grained sand, light gray and orange brown at 308.0ft BGS			26				14.2
315								5.4
320								
325	SC - CLAYEY SAND, soft, light gray and orangish brown	-203.95		27				1.8
330								1.2
335	SW - SAND, fine to medium grained sand, interbedded layers of dark and light gray sand	-213.95						0.0
340	- loose, medium grained sand, light brown, no odor at 338.0ft BGS			28				
345								
350	- gray at 350.0ft BGS							1.3
355				29				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-87

DATE COMPLETED: October 4, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
365	- trace silt and clay, light brown and gray at 362.0ft BGS	-246.95	CHIP SEAL CEMENT/ BENTONITE GROUT	30				16.1
370	SM - CLAYEY SAND AND SILT, fine grained sand, light and dark gray, no odor	-250.95						0.0
375	CLAY, stiff, dark gray, no odor							
380								0.0
385								
390	SAND, trace clay, fine grained sand, light gray, no odor	-266.95		31				0.0
395								
400								
405			SAND PACK					
410			MW-84D2 WELL SCREEN	32				5.8
415								
420	- trace silt, medium grained, tan and brown at 418.0ft BGS							0.4
425								
430	- trace clay and silt, fine grained, light gray at 430.0ft BGS			33				0.3
435			BENTONITE CHIP SEAL					
440	- trace silt, loose, medium grained sand, tan and reddish brown at 438.0ft BGS							
445				34				0.8

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-87

PROJECT NUMBER: 6883

DATE COMPLETED: October 4, 2005

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	END OF BOREHOLE @ 450.0ft BGS	-328.95	<b>WELL DETAILS</b> Screened interval: -185.95 to -195.95ft AMSL 307.00 to 317.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal: -172.95 to -177.95ft AMSL 294.00 to 299.00ft BGS Material: BENTONITE CHIPS Sand Pack: -177.95 to -197.95ft AMSL 299.00 to 319.00ft BGS Material: #1 SILICA SAND  Screened Interval: -283.95 to -293.95ft AMSL 405.00 to 415.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal: -197.95 to -278.95ft AMSL 319.00 to 400.00ft BGS Material: BENTONITE CHIPS Sand Pack: -278.95 to -294.95ft AMSL 400.00 to 416.00ft BGS Material: #1 SILICA SAND					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-88

DATE COMPLETED: March 22, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE	120.89						
5	SAND AND GRAVEL, trace silt, loose, medium-coarse, orange brown		CONCRETE					0.0
10			MW-88D1 TOP OF CASING 120.17 ft AMSL					
15		104.89	MW-88D2 TOP OF CASING 120.05 ft AMSL					
20	SAND AND GRAVEL, silty, loose, medium-coarse, tan brown		CEMENT/ BENTONITE GROUT					0.0
25		94.89						
30	SAND, loose, fine-medium sand, tan brown		2" SCH 40 BLACK IRON RISER					0.0
35	- red brown at 33.0ft BGS							
40		84.89						0.0
45	SAND AND SILT, loose, fine-medium sand, tan brown		2" SCH 80 PVC RISER					
50		74.89						0.0
55	SAND, loose, fine-medium sand, tan brown							
60	- light gray clay, stiff at 50.0ft BGS - light gray medium sand, loose at 52.0ft BGS							0.0
65		64.89						
70	SAND, loose, medium sand, light gray							0.0
75		54.89						
80	SAND, loose, fine-medium sand, light gray							0.0
85		44.89						0.5
	SAND AND SILT, loose, fine-medium sand, tan brown							
	- light gray clay, stiff at 84.0ft BGS							0.0
		34.89						
	SAND, loose, medium sand, tan brown							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

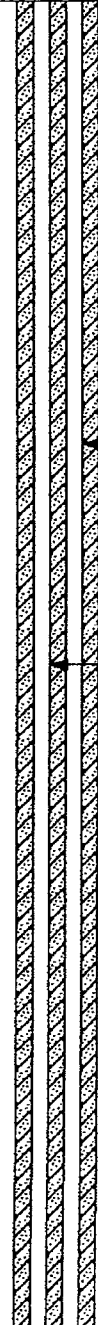
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-88

DATE COMPLETED: March 22, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
95	- clay lens at 94.0ft BGS	24.89	 <p>CEMENT/ BENTONITE GROUT</p> <p>2" SCH 40 BLACK IRON RISER</p> <p>2" SCH 80 PVC RISER</p>					0.0
100	SAND, loose, medium sand, tan brown and light gray							0.0
105	SAND, medium sand, tan brown	14.89						0.0
115	SAND, loose, fine-medium sand, tan brown	4.89						0.0
140	SAND, loose, fine-medium sand, tan brown and light gray	-17.11						7.8
175	SILTY CLAY, stiff, dark gray	-57.11						0.2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 6

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-88

PROJECT NUMBER: 6883

DATE COMPLETED: March 22, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
185								0.0
190								
195	SAND AND SILT, fine-medium sand, tan brown and light gray	-71.11	CEMENT/ BENTONITE GROUT					3.5
200	SILTY CLAY, stiff, dark gray	-77.11						
205			2" SCH 40 BLACK IRON RISER					0.0
210	SAND AND SILT, trace clay, firm to stiff, fine sand, tan brown, orange mottles	-89.11						0.2
215								
220	SAND, trace clay, firm, fine sand, orange brown, sweet odor	-97.11	2" SCH 80 PVC RISER					7.1
225	CLAY, trace silt, stiff, light gray	-104.11						
230								0.2
235	CLAY, stiff, dark gray	-114.11						0.1
240	SAND AND SILT, trace clay, fine sand, tan brown and light gray, orange mottles	-117.11						
245								0.2
250								
255								
260	SAND AND SILT, thin clay layers, fine sand, tan brown and light gray, orange mottles	-137.11						
265								3.3

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-88

DATE COMPLETED: March 22, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
275								
280	SAND AND SILT, fine sand, tan brown, orange mottles	-157.11						7.1
285								
290	SILTY CLAY, stiff, dary gray	-169.11						0.1
295								
300	SAND AND SILT, fine-medium sand, tan brown, gray and orange mottles	-177.11						5.8
305								
310	SAND, loose, medium sand, tan brown, sweet odor	-187.11						32.3
315	SAND AND SILT, trace clay, firm, fine sand, light gray	-192.11						6.3
320								
325	SILTY CLAY, stiff, gray	-201.11						0.0
330								
335	SAND, loose, medium sand, tan brown, sweet odor	-207.11						28.0
340								
345								
350	SAND, trace silt, medium sand, tan brown	-227.11						5.8
355								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

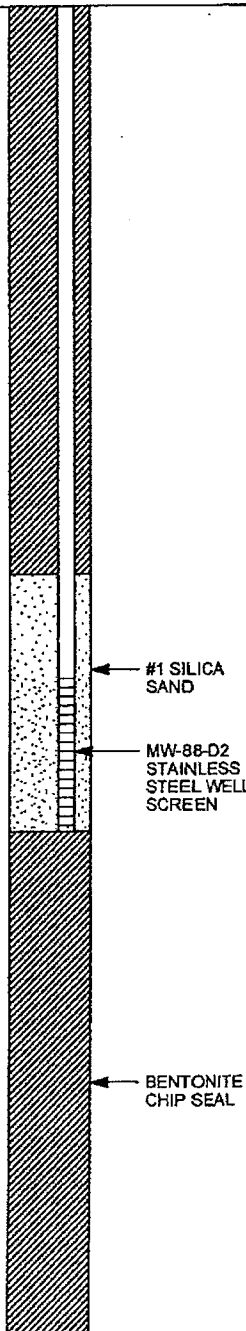
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-88

DATE COMPLETED: March 22, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
365	SAND AND SILT, firm, fine sand, light gray	-240.11						47.0
370								
375								
380	SAND AND SILT, firm, fine-medium sand, light gray	-259.11						58.7
385								
390	- tan brown at 392.0ft BGS							35.7
395								
400	SAND AND SILT, loose, fine-medium sand, pale red	-279.11						34.5
405								
410								
415								7.1
420	- tan brown at 420.0ft BGS							
425								
430	SAND, loose, fine-medium sand, tan brown	-309.11						2.1
435								
440								
445	SAND AND SILT, medium sand, pale red	-321.11						1.8

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 6 of 6

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-88

DATE COMPLETED: March 22, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
	END OF BOREHOLE @ 450.0ft BGS	-329.11	<b>WELL DETAILS</b> Screened Interval: -184.11 to -194.11ft AMSL 305.00 to 315.00ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: SCH 80 PVC Seal: -171.89 to -176.78ft AMSL 292.58 to 297.67ft BGS Material: BENTONITE CHIPS Sand Pack: -176.78 to -199.53ft AMSL 297.67 to 320.42ft BGS Material: #1 SILICA SAND  Screened Interval: -284.69 to -294.69ft AMSL 405.58 to 415.58ft BGS Length: 10ft Diameter: 2in Slot Size: 10 Material: STAINLESS STEEL Seal: -199.53 to -277.61ft AMSL 320.42 to 398.50ft BGS Material: BENTONITE CHIPS Sand Pack: -277.61 to -295.11ft AMSL 398.50 to 416.00ft BGS Material: #1 SILICA SAND					
455								
460								
465								
470								
475								
480								
485								
490								
495								
500								
505								
510								
515								
520								
525								
530								
535								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA\_CORP.GDT 1/30/07

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 5

PROJECT NAME Hooler Run  
 PROJECT NUMBER 6983  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
 DRILLER G. Soley  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-89  
 DATE/TIME STARTED 12/6/10  
 DATE/TIME COMPLETED 12/16/10  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Day

STRATIGRAPHIC INTERVALS DEPTHS IN ft/m BGS			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E L I N G D	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)							S A M P L E L E N G T H F E E T	P I D F I D (ppm)	C H E M I C A L	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R					
0		37				tan brown medium-coarse sand + gravel, some fine sand + silt, loose										
		40														
40		53	dark gray/black silty clay, stiff									0.0				
53		57	tan brown to grayish brown medium sand, some fine sand + silt, loose									0.0				
57		74	grayish brown medium sand, some fine sand + silt, loose									0.0				
74		77	orangish-brown medium sand, loose									0.0				
77		97	light gray fine-medium sand clay lenses at 80-81', 85-87'									0.0				
97		117	light gray fine-medium sand, clay lenses at 106-107', 106-107', 113-114'									0.0				
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____													





## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 5

PROJECT NAME Hicks Run  
 PROJECT NUMBER 6887  
 CLIENT GS&E  
 LOCATION Hicksville, NY

DRIILLING CONTRACTOR \_\_\_\_\_  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-89  
 DATE/TIME STARTED \_\_\_\_\_  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD \_\_\_\_\_  
 CRA SUPERVISOR \_\_\_\_\_

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/in BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E L I N G D	SAMPLE DETAILS						P I D / F I D (ppm)	C H E M I C A L	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)								
			ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).			8"	8"	8"	8"	N	R			
117		132	light gray medium sand, loose										0.1	
132		137	light gray + tan brown mottled fine sand w/ some silt, firm										0.0	
137		150	light gray medium sand, loose										0.0	
150		157	light gray + tan brown fine-medium sand some silt, firm										0.0	
157		163	SAME										0.0	
163		167	tan brown silty clay, stiff										0.0	
167		177	light gray medium sand, some fine sand + silt loose										0.0	
177		192	light gray fine sand + silt, some medium sand orange mottles, firm										0.0	
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____											
			WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____											
NOTES			COMPLETION DETAILS: _____											
			NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.											



# STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 5

PROJECT NAME Hooker River  
PROJECT NUMBER 6883  
CLIENT GSITE  
LOCATION Hicksville, NY

DRILLING CONTRACTOR \_\_\_\_\_  
DRILLER \_\_\_\_\_  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-89  
DATE/TIME STARTED \_\_\_\_\_  
DATE/TIME COMPLETED \_\_\_\_\_  
DRILLING METHOD \_\_\_\_\_  
CRA SUPERVISOR \_\_\_\_\_

STRATIGRAPHIC INTERVALS (DEPT'S IN ft/in BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E T H I C K N E S S	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E	
F R O M	T O	A T				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)	6"	6"	6"	6"	N					R
192	195		light gray medium sand, loose									0.0				
197	217		light gray + tan brown fine sand + silt firm									0.0				
217	225		dark gray silty clay, stiff									0.0				
225	230		tan brown fine sand + silt, firm									0.0				
230	232		dark gray silty clay, st. ft									0.0				
232	237		orange brown fine sand, loose									0.0				
237	257		orange brown fine-med sand, loose									0.0				
257	262		SAME									0.0				
262	277		light gray fine sand, firm									0.2				

DEPTH OF BORE-HOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTES AND COMMENTS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 4 OF 5

PROJECT NAME Hodges-Ruco  
 PROJECT NUMBER 6839  
 CLIENT CSHE  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR \_\_\_\_\_  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-89  
 DATE/TIME STARTED \_\_\_\_\_  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD \_\_\_\_\_  
 CRA SUPERVISOR \_\_\_\_\_

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										GRAIN SIZE
FROM	AT	TO		SAMPLE #	SAMPLE LENGTH IN FT	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						SAMPLE INTERVAL	P / F ID	
						8"	8"	8"	8"	N	R		(ppm)	
277		297	tan brown fine sand, sweet odor firm										1.8	
297		317	tan brown med sand w/ some fine sand + silt, loose, sweet odor										3.4	
317		333	tan brown + light gray fine-medium sand + silt, loose, sweet odor										2.3	
333		338	light gray fine sand + silt, firm, sweet odor										5.8	
338		348	light gray fine-med sand + silt, loose sweet odor										3.7	
347		357	tan brown medium sand, loose, sweet odor										3.5	
357		373	tan brown + gray brown fine sand + silt, clay lenses, firm, odor										5.8	
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL. NOTES: _____											



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 5 OF 5

PROJECT NAME Hooke-Ruco  
 PROJECT NUMBER 6383  
 CLIENT GS&F  
 LOCATION Hicksville, NY

DILLING CONTRACTOR \_\_\_\_\_  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION \_\_\_\_\_  
 DATE/TIME STARTED \_\_\_\_\_  
 DATE/TIME COMPLETED \_\_\_\_\_  
 DRILLING METHOD \_\_\_\_\_  
 CRA SUPERVISOR \_\_\_\_\_

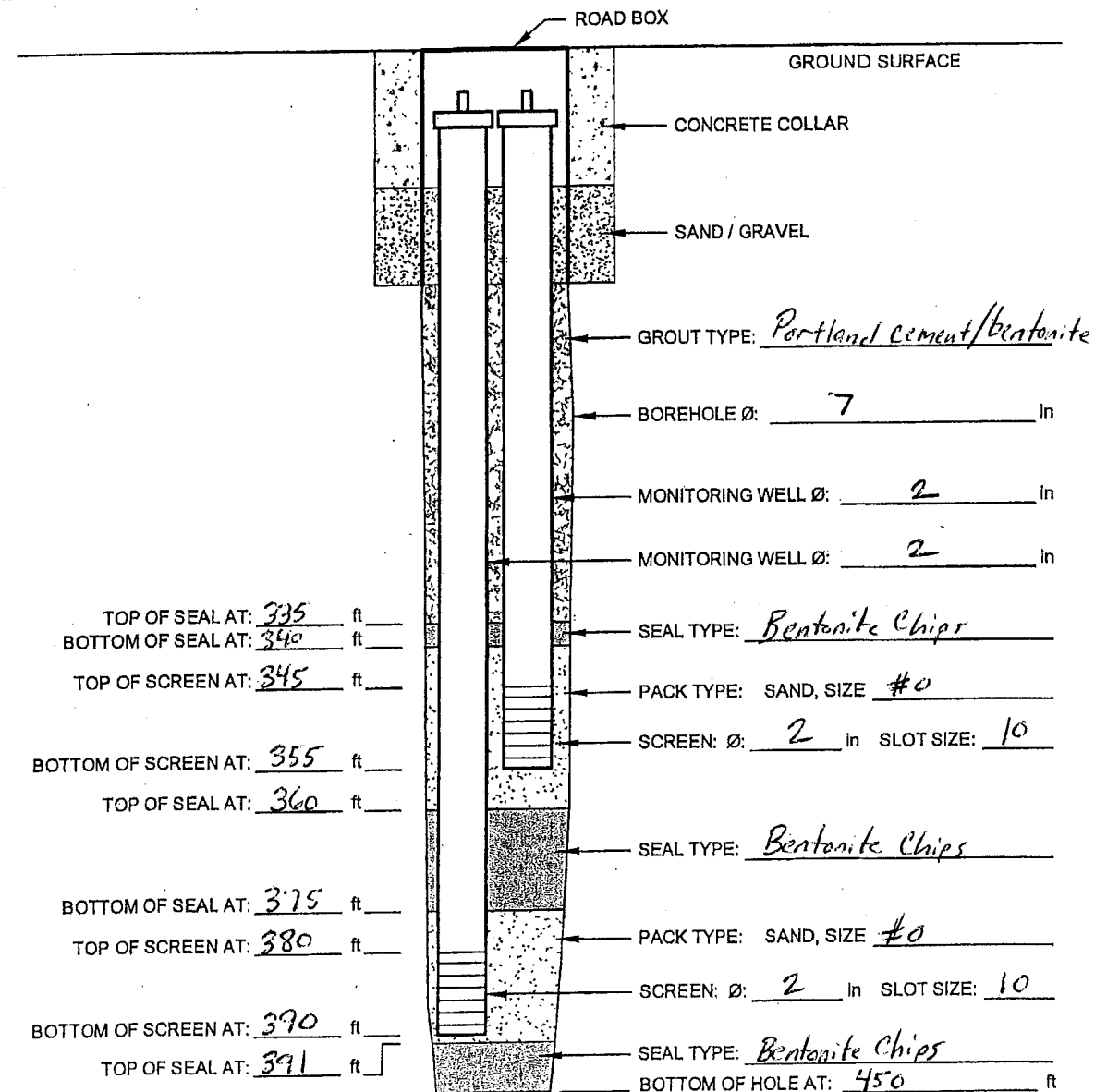
STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOLS - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L I N G M E T H O D	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
377		377	reddish brown med sand, some fine sand + silt, firm, slight odor									2.2			
377		387	reddish brown fine-med sand, sweet odor loose, some silt									3.0 1.9			
387		397	reddish brown fine sand, firm, sweet odor									1.3			
397		408	reddish brown fine sand, some silt, slight odor									2.5			
408		418	reddish brown fine-med sand, some silt, slight odor									1.2			
428		434	light gray + reddish brown mottled fine sand + silt, firm, no odor									1.6			
434		450	light gray + reddish brown medium sand loose									3.0			
NOTES AND COMMENTS			DEPTH OF BOREHOLE CAVING _____ DEPTH OF FIRST GROUNDWATER ENCOUNTER _____ TOPSOIL THICKNESS _____ WATER LEVEL IN OPEN BOREHOLE ON COMPLETION _____ AFTER _____ HOURS _____ COMPLETION DETAILS: _____ NOTE: FOR EACH SPUT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL NOTES: _____												



450' - END OF BORING

# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco HOLE DESIGNATION: MW-89  
 PROJECT No: 6883 DATE COMPLETED: 12/19/10  
 CLIENT: Glenn Springs Holdings DRILLING METHOD: Sonic  
 LOCATION: Hicksville, NY CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 450' 7" to 418' 8" to 18' in

DEVELOPMENT: METHOD: Airlift DURATION: 2.5 hrs - 750 gals each

D1 + D2



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 4

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-90D1

PROJECT NUMBER: 6883

DATE COMPLETED: March 28, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE	123.31						
5	SAND AND SILT, with gravel, medium sand, orange brown		CONCRETE					0.0
10			MW-90D1 TOP OF CASING 122.93 ft AMSL					
15		106.31	CEMENT/ BENTONITE GROUT					
20	SAND, with silt, with gravel, medium sand, orange brown							0.0
25		96.31						
30	SAND AND GRAVEL, loose, medium to coarse sand, tan brown		1.5" Ø SCH 40 BLACK IRON RISER					0.0
35		87.31						
	SILTY CLAY, stiff, light gray	86.31						
40	SAND AND SILT, loose, fine sand, gray and orange	83.31						
	SAND, loose, fine sand, tan brown, no odor							
45			1" Ø SCH 80 PVC RISER					0.0
50								
55		68.31						
	SILTY CLAY, firm, light gray, no odor	66.31						
60	SAND, loose, medium sand, no odor, tan brown							
65								0.0
70								
75								
80	- tan brown and grayish brown at 77.0 ft BGS							0.6
85								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 12/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 4

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-90D1

DATE COMPLETED: March 28, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
95	SAND AND SILT, some clay, firm, fine sand, light gray with orange mottles  - orange mottles end at 97.0ft BGS	33.31	<p>CEMENT/ BENTONITE GROUT</p> <p>1.5" Ø SCH 40 BLACK IRON RISER</p> <p>1" Ø SCH 80 PVC RISER</p>					3.3
100								3.3
105								
110	SAND, loose, fine-medium sand, tan brown, sweet odor  - light gray at 117.0ft BGS	13.31						2.7
115								
120								8.3
125								
130								
135								
140	SAND AND SILT, trace clay, firm, fine-medium sand, light gray, sweet odor	-13.69						6.9
145								
150								
155								
160	SAND, loose, medium sand, light gray	-33.69						18.7
165								
170								
175	- sweet odor at 177.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 4

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

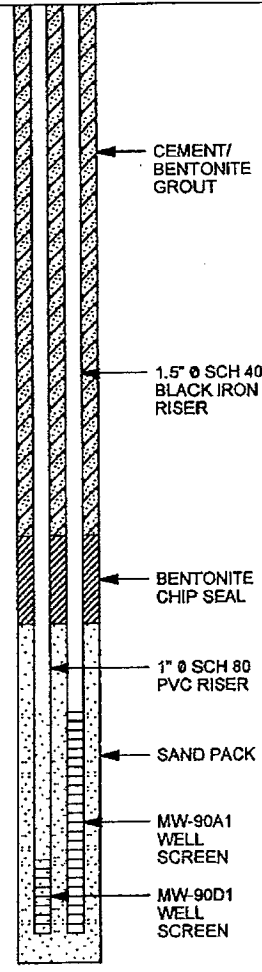
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-90D1

DATE COMPLETED: March 28, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
185	SILTY CLAY, firm, light gray	-61.69	 <p>CEMENT/ BENTONITE GROUT</p> <p>1.5" Ø SCH 40 BLACK IRON RISER</p> <p>BENTONITE CHIP SEAL</p> <p>1" Ø SCH 80 PVC RISER</p> <p>SAND PACK</p> <p>MW-90A1 WELL SCREEN</p> <p>MW-90D1 WELL SCREEN</p> <p><b>WELL DETAILS</b> Screened interval: -114.69 to -119.69ft AMSL 238.00 to 243.00ft BGS Length: 5ft Diameter: 1.5in Slot Size: 10 Material: STAINLESS STEEL Seal: -92.69 to -98.69ft AMSL 216.00 to 222.00ft BGS Material: BENTONITE CHIPS Sand Pack: -98.69 to -121.69ft AMSL 222.00 to 245.00ft BGS Material: #1 SILICA SAND</p>					20.4
190	SAND AND SILT, loose, fine-medium sand, tan brown	-66.69						0.0
195	SAND, loose, medium sand, tan brown, sweet odor	-73.69						1.3
200								
205								34.4
210								
215								
220								
225								80.4
230								
235		-113.69						
240	SAND AND SILT, trace clay, firm, fine sand, tan brown							23.3
245	CLAY, trace silt, stiff, light gray	-121.69						0.0
250	END OF BOREHOLE @ 250.0ft BGS	-126.69						
255								
260								
265								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 4

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: MW-90D1

PROJECT NUMBER: 6883

DATE COMPLETED: March 28, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N VALUE	PID (ppm)
275			Screened Interval: -104.69 to -119.69ft AMSL 228.00 to 243.00ft BGS Length: 15ft Diameter: 1in Slot Size: 10 Material: SCH 80 PVC Seal: -92.69 to -98.69ft AMSL 216.00 to 222.00ft BGS Material: BENTONITE CHIPS Sand Pack: -98.69 to -121.69ft AMSL 222.00 to 245.00ft BGS Material: #1 SILICA SAND					
280								
285								
290								
295								
300								
305								
310								
315								
320								
325								
330								
335								
340								
345								
350								
355								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883 GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 5

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-90D2

DATE COMPLETED: March 28, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE TOP OF CASING	123.29 122.85						
5	SAND AND SILT, with gravel, medium sand, orange brown							0.0
10								
15								
20	SAND, with silt, with gravel, medium sand, orange brown	106.29						0.0
25								
30	SAND AND GRAVEL, loose, medium to coarse sand, tan brown	96.29						0.0
35								
40	SILTY CLAY, stiff, light gray	87.29						
40	SAND AND SILT, loose, fine sand, gray and orange	86.29						
40	SAND, loose, fine sand, tan brown, no odor	83.29						
45								0.0
50								
55	SILTY CLAY, firm, light gray, no odor	68.29						
60	SAND, loose, medium sand, no odor, tan brown	66.29						
65								0.0
70								
75								
80	- tan brown and grayish brown at 77.0ft BGS							0.6
85								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 5

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

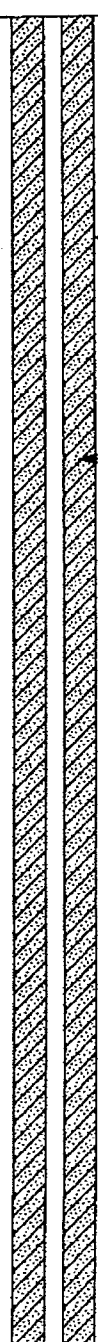
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-90D2

DATE COMPLETED: March 28, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
95	SAND AND SILT, some clay, firm, fine sand, light gray with orange mottles  - orange mottles end at 97.0ft BGS	33.29	 CEMENT/ BENTONITE GROUT  1.5" Ø SCH 40 BLACK IRON RISER					3.3
100								3.3
105								
110	SAND, loose, fine-medium sand, tan brown, sweet odor	13.29						2.7
115	- light gray at 117.0ft BGS							
120								8.3
125								
130								
135								
140	SAND AND SILT, trace clay, firm, fine-medium sand, light gray, sweet odor	-13.71						6.9
145								
150								
155								
160	SAND, loose, medium sand, light gray	-33.71						18.7
165								
170								
175	- sweet odor at 177.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG: 6883.GPJ, CRA, CORP. GDT, 12/20/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 5

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-90D2

DATE COMPLETED: March 28, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
185	SILTY CLAY, firm, light gray	-61.71						20.4
190	SAND AND SILT, loose, fine-medium sand, tan brown	-66.71	CEMENT/ BENTONITE GROUT					0.0
195								1.3
200	SAND, loose, medium sand, tan brown, sweet odor	-73.71						
205			1.5" Ø SCH 40 BLACK IRON RISER					34.4
210								
215			BENTONITE CHIP SEAL					
220								
225								80.4
230								
235								
240	SAND AND SILT, trace clay, firm, fine sand, tan brown	-113.71						23.3
245	CLAY, trace silt, stiff, light gray	-121.71						0.0
250	SAND AND SILT, loose, fine sand, tan brown	-126.71						
255								54.4
260	SAND, trace silt, loose, fine-medium sand, orange brown	-133.71	BENTONITE CHIP SEAL					
265			MW-90D2 WELL SCREEN					22.2
		-145.71						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ GRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 4 of 5

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

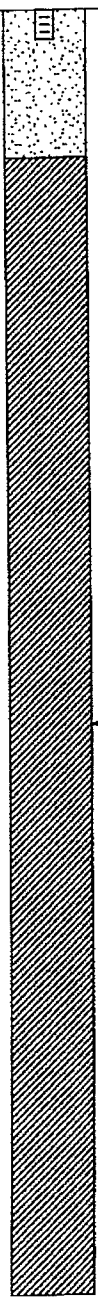
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-90D2

DATE COMPLETED: March 28, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
								6.9
	SAND, trace gravel, medium-coarse sand, orange brown	-148.71						0.0
275	SILTY CLAY, stiff, massive, gray							7.5
		-155.71						38.0
280	SAND, firm, fine-medium sand, brown red orange gray							20.0
285		-166.71						17.7
290	SAND, trace clay, loose, moist, tan brown							5.8
295		-173.71						0.0
300	SAND, trace silt, loose, fine-medium sand, tan brown, sweet odor							25.4
305								
310		-188.71						59.3
315	SILTY CLAY, stiff, dark gray							
320	SAND, trace silt, medium sand, light gray with orange mottles	-195.71						
325								
330								
335	- loose, tan brown at 337.0ft BGS							
340								
345								
350								
355		-233.71						
	END OF BOREHOLE @ 357.0ft BGS		WELL DETAILS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 5 of 5

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: MW-90D2

DATE COMPLETED: March 28, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N VALUE	PID (ppm)
365			Screened interval: -143.71 to -148.71ft AMSL 267.00 to 272.00ft BGS Length: 5ft Diameter: 1.5in Slot Size: 10 Material: STAINLESS STEEL Seal: -135.71 to -138.71ft AMSL 259.00 to 262.00ft BGS Material: BENTONITE CHIPS Sand Pack: -138.71 to -158.71ft AMSL 262.00 to 280.00ft BGS Material: #1 SILICA SAND					
370								
375								
380								
385								
390								
395								
400								
405								
410								
415								
420								
425								
430								
435								
440								
445								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 3

PROJECT NAME Holar Rulo  
 PROJECT NUMBER 6883  
 CLIENT GSH&  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Bart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-92  
 DATE/TIME STARTED 3/9/11  
 DATE/TIME COMPLETED 3/10/11  
 DRILLING METHOD Senior  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E H I G H N O G D	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
0		37	tan brown medium-coarse sand & gravel, some silt + fine sand, loose										0.0		
37		57	tan brown fine-medium sand, loose, clay 50-51' + 54-57' no odor 20-50'										0.1		
57		77	tan brown to light gray medium-coarse sand, loose										0.3		
77		87	dark brown fine sand & silt, firm										0.2		
87		92	tan brown medium sand, loose										0.0		
92		97	tan brown + light gray fine sand & silt, firm, odor										0.8		
97		112	light brown + gray silty clay, stiff										0.0		
112		117	light gray fine sand, loose, slight odor										0.3		
117		127	light gray fine-medium sand, loose, odor										0.9		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES:



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 3

PROJECT NAME Hooker, Pucc  
 PROJECT NUMBER 6883  
 CLIENT GSHZ  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MLW-92  
 DATE/TIME STARTED 8/20/11  
 DATE/TIME COMPLETED 2/10/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E T H I C K N E S S	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)						S A M P L E V A L	F I D / F I D (ppm)	C H E M I C A L	A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				6"	6"	6"	6"	N	R					
127		147				light gray medium sand, loose, odor										
147		157	light brown medium sand, loose									1.3				
157		170	light brown fine-medium sand, some silt, firm									0.3				
170		177	light gray fine sand, loose, some med sand									0.9				
177		197	tan brown + light gray fine-med sand, some silt, loose									0.9				
197		217	light brown fine-medium sand, silty pockets, odor, firm									1.3				
217		237	light brown fine-medium sand, some silt, odor									2.4				
237		247	broken core barrel sand to clay									—				
247		251	dark gray silty clay, stiff									0.0				
251		257	tan brown fine-medium sand/silt, firm									0.3				

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL

NOTES: \_\_\_\_\_





## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 3

PROJECT NAME Hooker, Ruco  
PROJECT NUMBER 6583  
CLIENT GSHZ  
LOCATION Hicksville, NY

DRILLING CONTRACTOR Brent Longyear  
DRILLER \_\_\_\_\_  
SURFACE ELEVATION \_\_\_\_\_  
WEATHER (A.M.) \_\_\_\_\_  
(P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-92  
DATE/TIME STARTED 3/8/11  
DATE/TIME COMPLETED 3/10/11  
DRILLING METHOD Sonic  
CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS										SAMPLER	INTERVAL	P / P D	CHEMICAL	GRAIN SIZE
FROM	TO	AT	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	SAMPLER	NO	GD	6"	6"	6"	6"	N	R	SAMPLER	INTERVAL	P / P D (ppm)	CHEMICAL	GRAIN SIZE
257	265		light brown + light gray fine-med sand + silty, firm													11.9		
265	277		light gray silty sand, firm, some clay													0.0		
277	297		light gray silty clay, St. fl													0.0		
280	297		tan brown fine-medium sand, silty pockets, firm													37.0		
297	310		light brown fine-medium sand, loose													11.6		
310	322		dark gray silty clay, St. fl													0.0		
322	327		light gray fine sand + silt, firm, real mottles													0.0		
327	347		light gray fine sand + silt, firm, no odor													0.0		
347			END OF BORING															

DEPTH OF BOREHOLE CAVING \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_

TOPSOIL THICKNESS \_\_\_\_\_

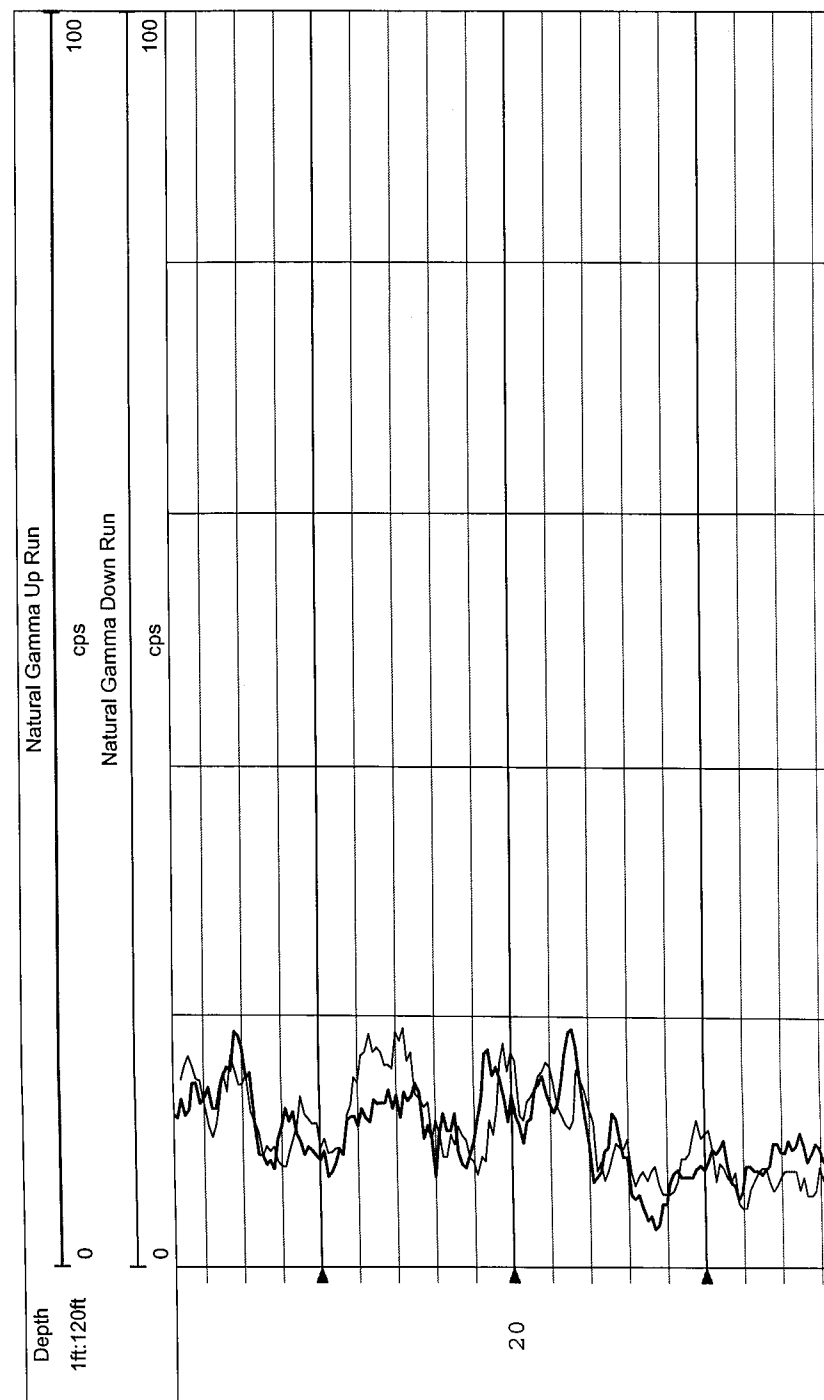
NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

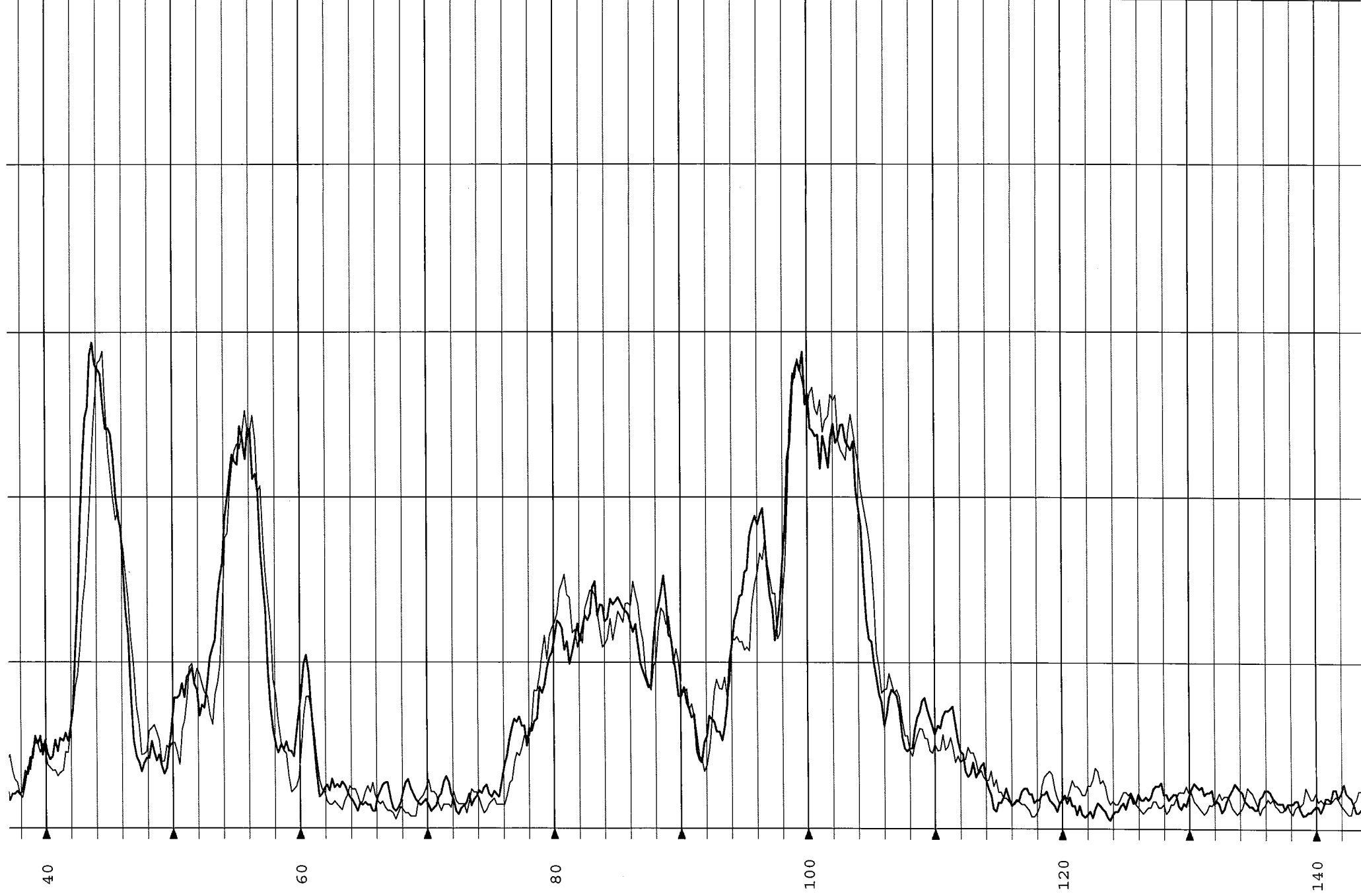
NOTES:

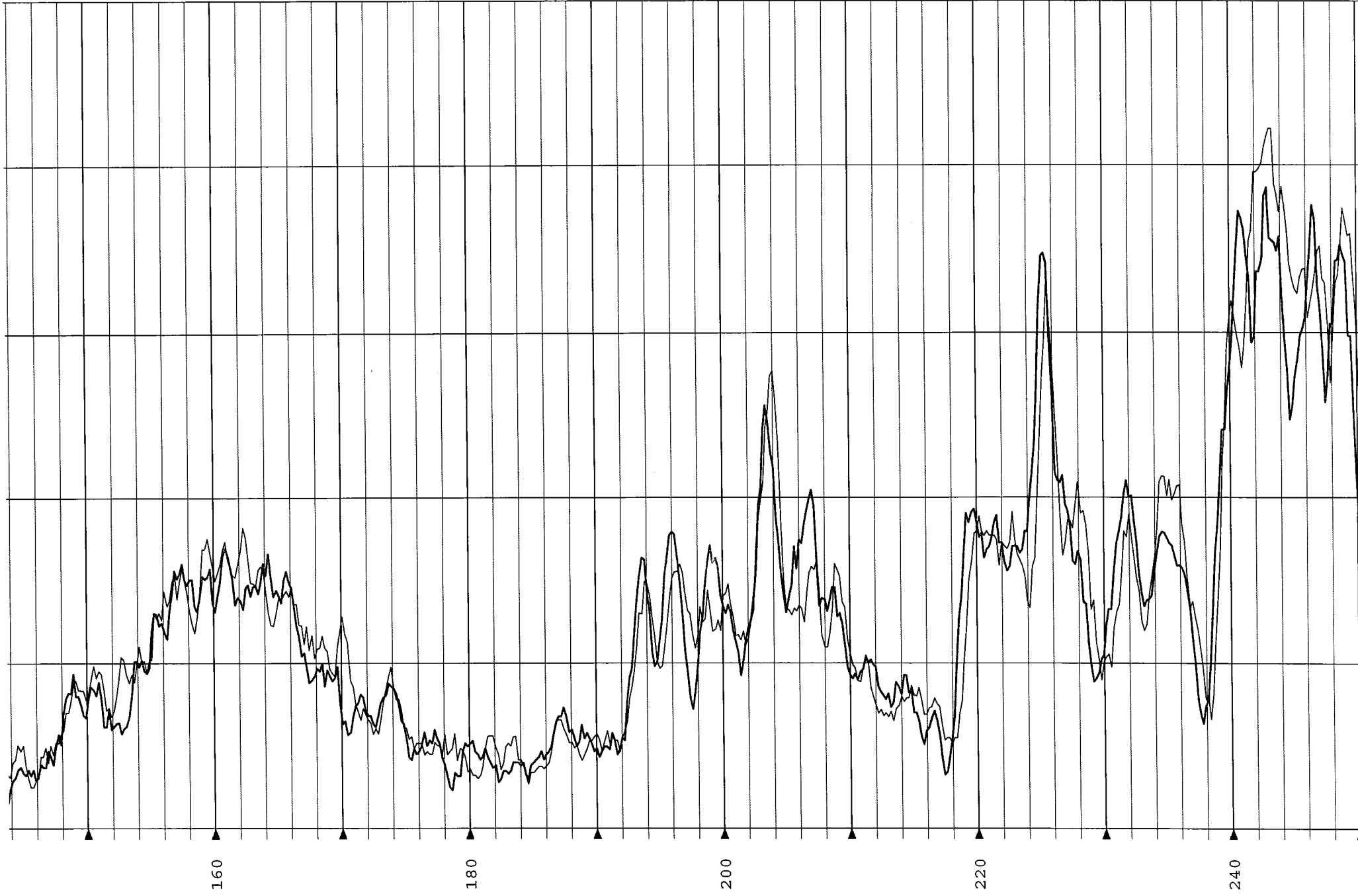


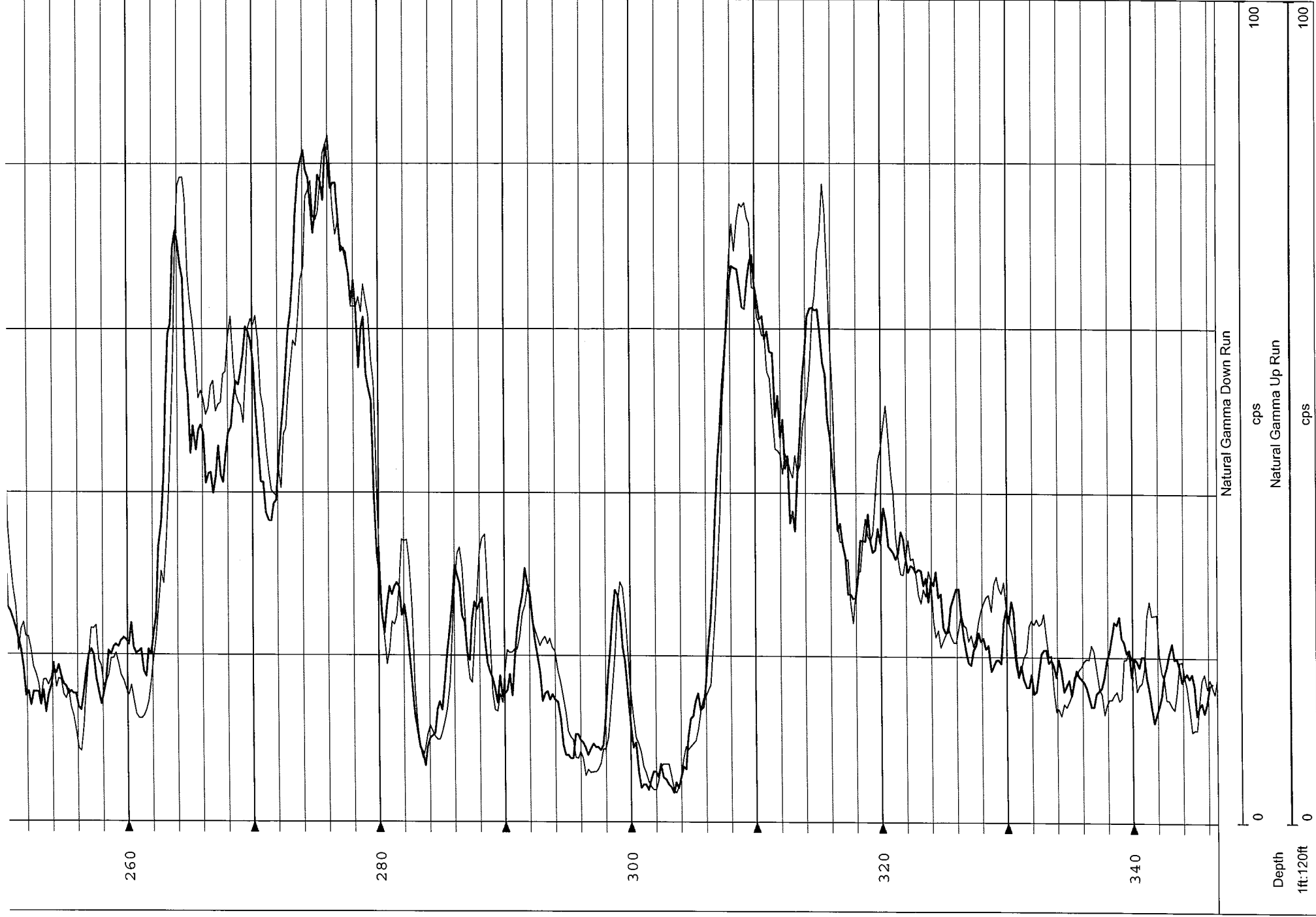
AQUA TERRA GEOPHYSICS INC.  
13 Station Court, Bellport NY 11713  
631.286.7699

CO WELL FLD CTY STE FILING No	COMPANY BOART LONGYEAR						
	WELL ID MW - 92						
	FIELD HOOKER RUCO SUPERFUND SITE						
	TOWN HICKSVILLE				STATE NEW YORK		
LOCATION SLEEPYS PARKING LOT				OTHER SERVICES			
SEC		TWP		RGE			
LOGGING SPEED		20 FEET / MINUTE		ELEVATION		COMMENTS	
LOG MEAS. FROM		GROUND SURFACE					
DRILLING MEAS. FROM							
DATE		MARCH 11, 2011		TYPE FLUID IN HOLE		WATER	
DRILLING CO.				SALINITY			
TYPE LOG				CONDUCTIVITY			
DEPTH-DRILLER		347 FEET		LEVEL		50 FEET	
DEPTH-LOGGER		347.8 FEET		MAX. REC. TEMP.			
BTM LOGGED INTERVAL							
TOP LOGGED INTERVAL							
OPERATING RIG TIME							
RECORDED BY		BENJAMIN RICE					
WITNESSED BY		STEVE DALY					
RUN		BOREHOLE RECORD				CASING RECORD	
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
				8 INCH	STEEL	0 FEET	20 FEET
				7 INCH	STEEL	0 FEET	150 FEET
				6 INCH	STEEL	0 FEET	347.8 FEET









# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco

HOLE DESIGNATION: MW-92

PROJECT No: 6883

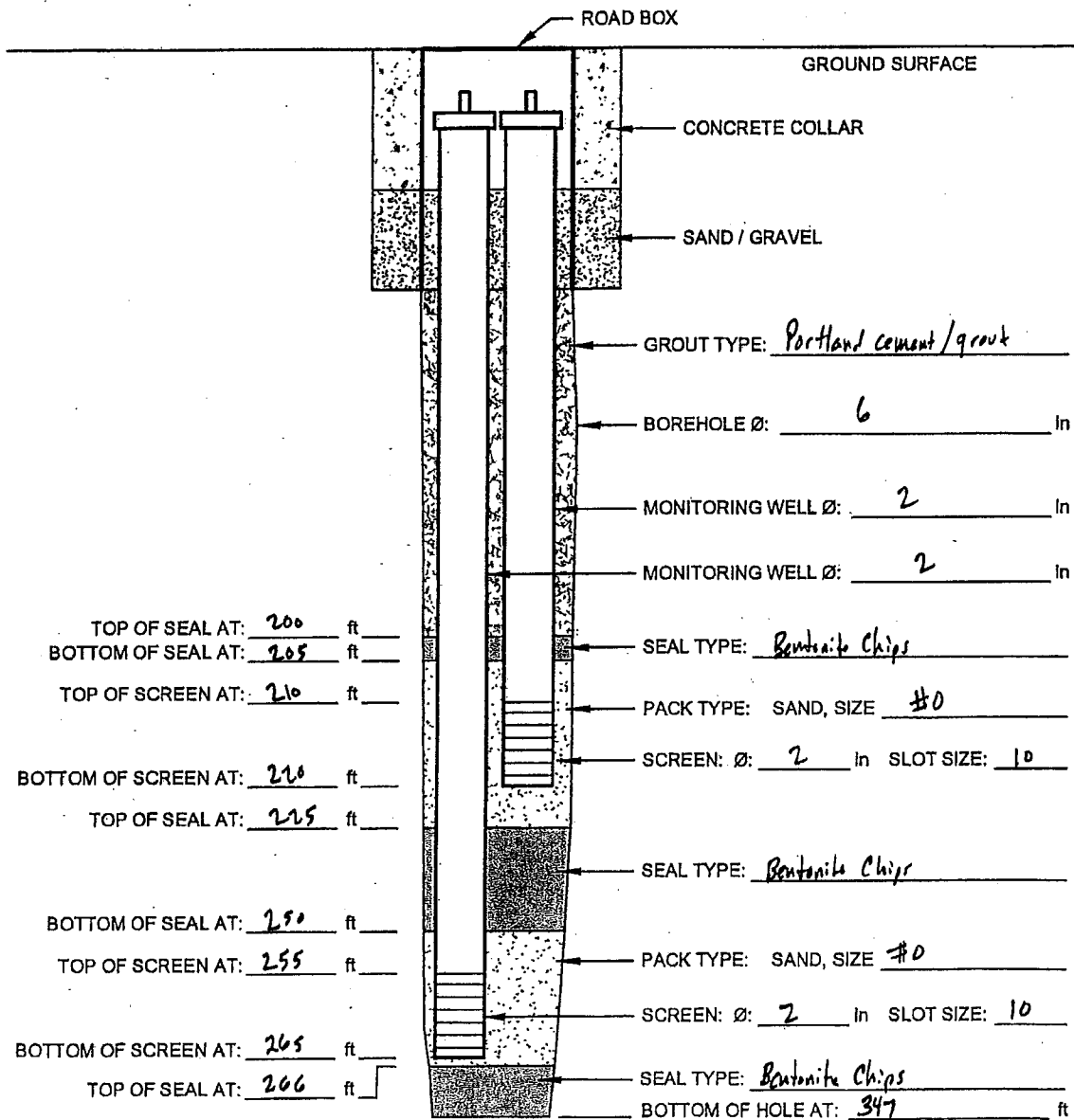
DATE COMPLETED: 3/11/11

CLIENT: GSHI

DRILLING METHOD: Sonic

LOCATION: Hicksville, NY

CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☐ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☐ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347 7" to 227 in

DEVELOPMENT: METHOD: Air lift DURATION: \_\_\_\_\_

## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 1 OF 3

PROJECT NAME Hoolar Ruco  
 PROJECT NUMBER 6893  
 CLIENT GSH  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boart Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-93  
 DATE/TIME STARTED 2/27/11  
 DATE/TIME COMPLETED 2/28/11  
 DRILLING METHOD sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E H I G H T N O D	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
0		37	dark brown + tan brown medium-coarse sand + gravel w/ fine sand + silt (f.i.)										0.0		
37		50	light brown medium sand, loose 20 50'										0.0		
50		57	light brown + light gray fine sand/silt, firm										0.0		
57		77	light brown + light gray fine-medium sand, loose										0.0		
77		97	light brown + light gray fine-medium sand, loose clay lens @ 84'										0.1		
97		117	light gray fine sand + silt, firm, slight sweet odor										0.7		
117		137	light gray medium sand, loose, slight sweet odor										0.4		
137		147	No Recovery										—		
147		167	light gray medium sand, loose, slight odor										1.4		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_



## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 2 OF 3

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6887  
 CLIENT GSHF  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Beant Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

HOLE DESIGNATION MW-93  
 DATE/TIME STARTED 2/27/11  
 DATE/TIME COMPLETED 2/28/11  
 DRILLING METHOD Sonic  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/in BGS)			SAMPLE DESCRIPTION  ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) - PRIMARY COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	S A M P L E #	S A M P L E L I N G D	SAMPLE DETAILS						S A M P L E I N T E R V A L	P I D / F I D  (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	6"	6"	6"	N	R				
167		177	light gray fine sand, some silt, firm, no odor										0.0		
177		187	brownish gray medium sand, loose, slight odor										0.4		
187		197	light gray + light brown fine sand + silt, <del>some</del> pockets of medium sand, firm										2.5		
197		207	tan brown fine-medium sand, loose										2.6		
207		217	tan brown fine-medium sand, loose										11.1		
217		227	tan brown fine sand, some medium sand, firm										2.2		
227		237	reddish brown medium sand, loose										3.3		
237		247	dark gray silty clay, stiff										0.0		
247		257	tan brown fine sand + silt, clayey pockets throughout										1.8		

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_, AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

NOTES: \_\_\_\_\_





## STRATIGRAPHY LOG (OVERBURDEN)

PAGE 3 OF 3

PROJECT NAME Hooker Run  
 PROJECT NUMBER 6883  
 CLIENT GJHE  
 LOCATION Hicksville, NY

DRILLING CONTRACTOR Boert Longyear  
 DRILLER \_\_\_\_\_  
 SURFACE ELEVATION \_\_\_\_\_  
 WEATHER (A.M.) \_\_\_\_\_  
 (P.M.) \_\_\_\_\_

BOLE DESIGNATION MW-93  
 DATE/TIME STARTED 7/27/11  
 DATE/TIME COMPLETED 7/28/11  
 DRILLING METHOD Senec  
 CRA SUPERVISOR S. Daly

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	S A M P L E #	S A M P L E I N T E R V A L #	SAMPLE DETAILS						S A M P L E I N T E R V A L #	P I D / F I D (ppm)	C H E M I C A L A N A L Y S I S	G R A I N S I Z E
F R O M	A T	T O				PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES)									
						6"	8"	6"	8"	N	R				
257		275	reddish brown medium sand, loose										1.5		
275		277	light gray silty clay, stiff										0.0		
277		287	reddish brown fine-medium sand, firm										6.8		
287		297	reddish brown fine-medium sand, firm										12.2		
297		304	tan brown medium sand, loose										9.9		
304		320	dark gray silty clay, stiff										0.0		
320		327	light gray fine sand & silt, some medium sand, loose										1.1		
327		347	light gray fine sand, some medium sand & silt, firm										10.7		
		347	End of Boring												

DEPTH OF BOREHOLE CAVING \_\_\_\_\_ DEPTH OF FIRST GROUNDWATER ENCOUNTER \_\_\_\_\_ TOPSOIL THICKNESS \_\_\_\_\_

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ HOURS \_\_\_\_\_

COMPLETION DETAILS: \_\_\_\_\_

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

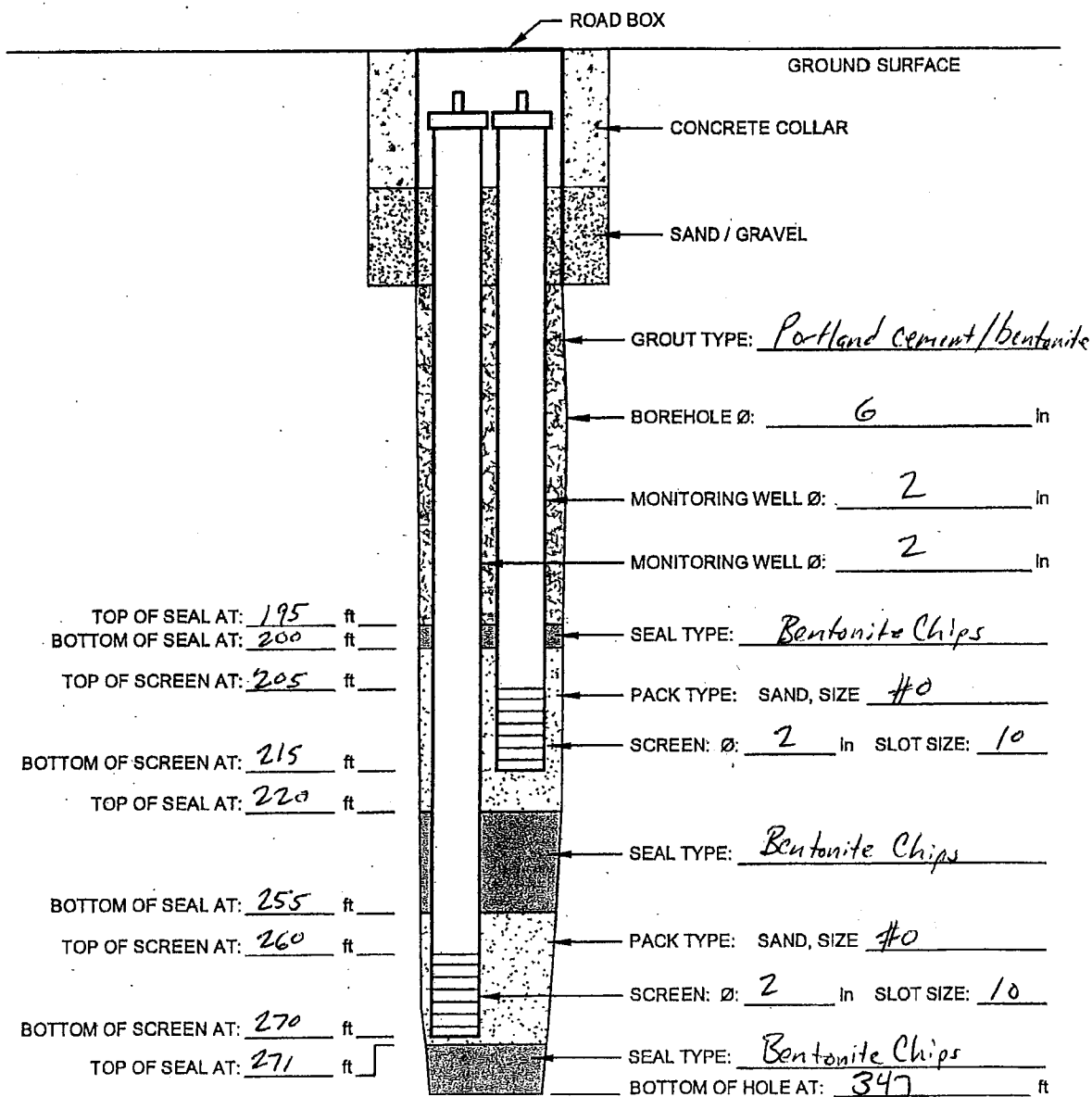
NOTES: \_\_\_\_\_



# GROUNDWATER MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: MW-93  
 DATE COMPLETED: 3/3/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: ☒ Stainless Steel ☐ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6" to 347' 7" to 217' in

DEVELOPMENT: METHOD: air lift DURATION: \_\_\_\_\_

# VADOSE ZONE MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Run

HOLE DESIGNATION: V2-1

PROJECT No: 6883

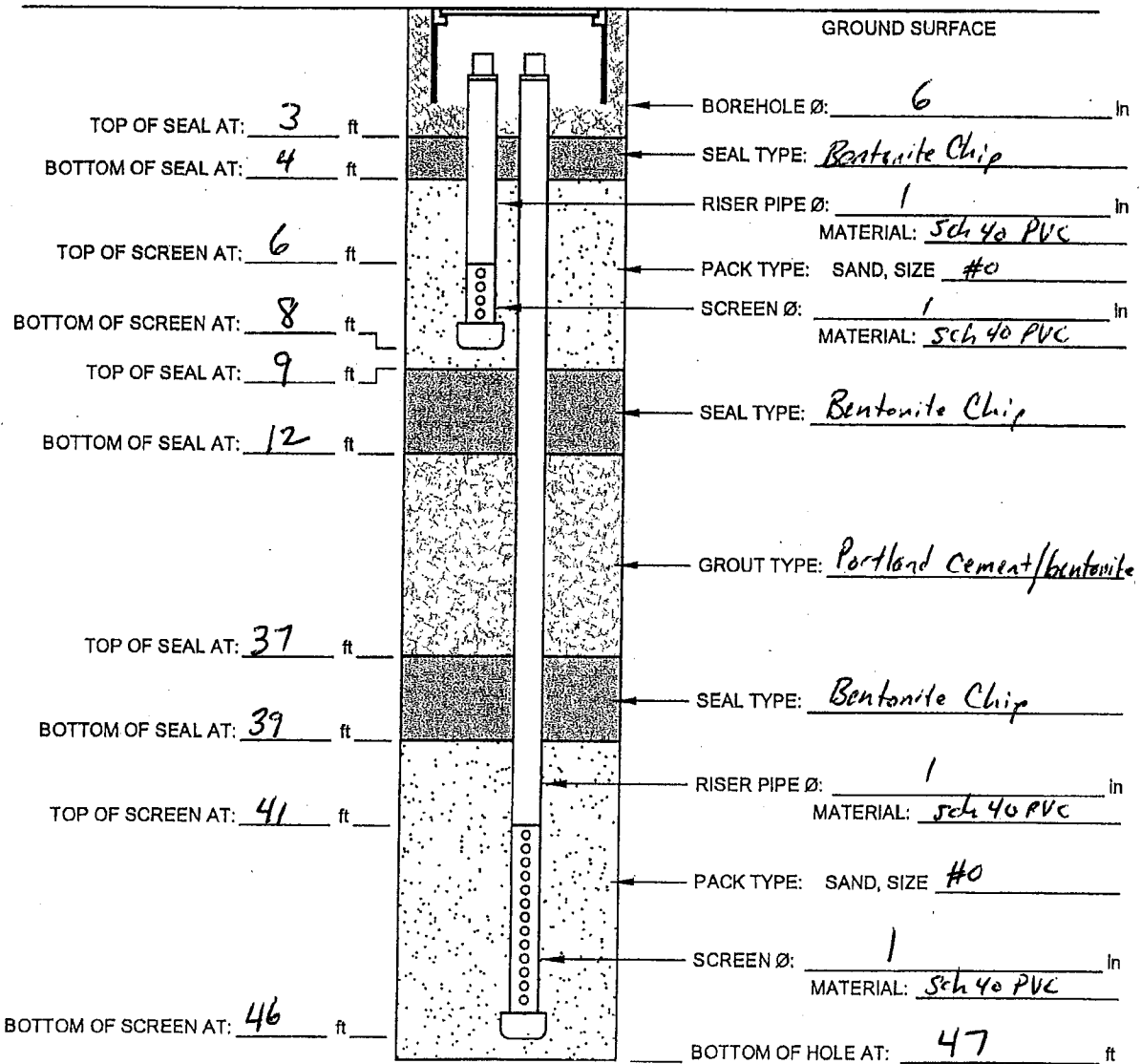
DATE COMPLETED: 3/15/11

CLIENT: GSHI

DRILLING METHOD: Sonic

LOCATION: Hicksville, NY

CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☒ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: AIR: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_

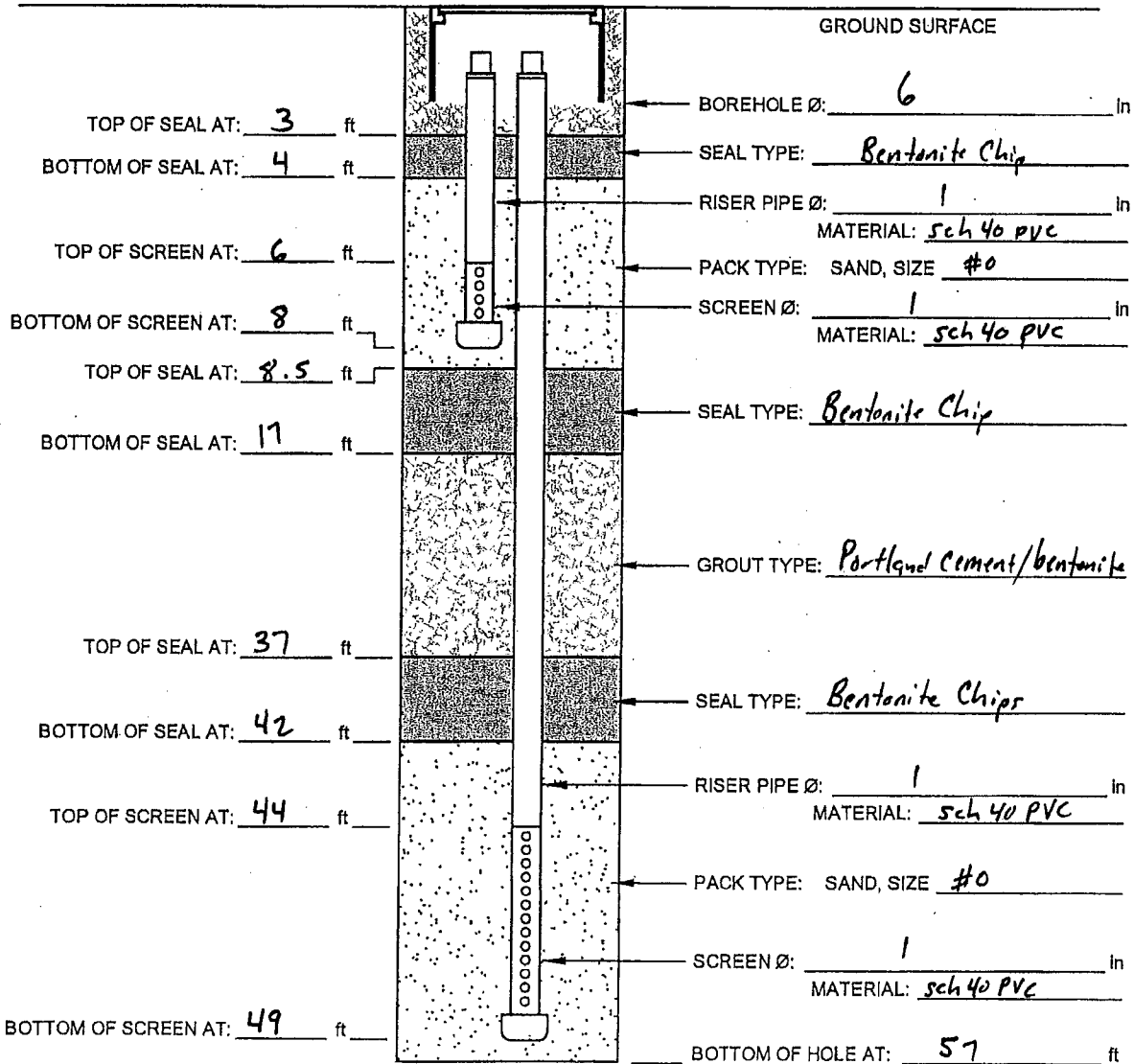
HOLE DIAMETER: 6

DEVELOPMENT: METHOD: \_\_\_\_\_ DURATION: \_\_\_\_\_

# VADOSE ZONE MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6683  
 CLIENT: GSHZ  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: VZ-2  
 DATE COMPLETED: 2/12/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: AIR: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_

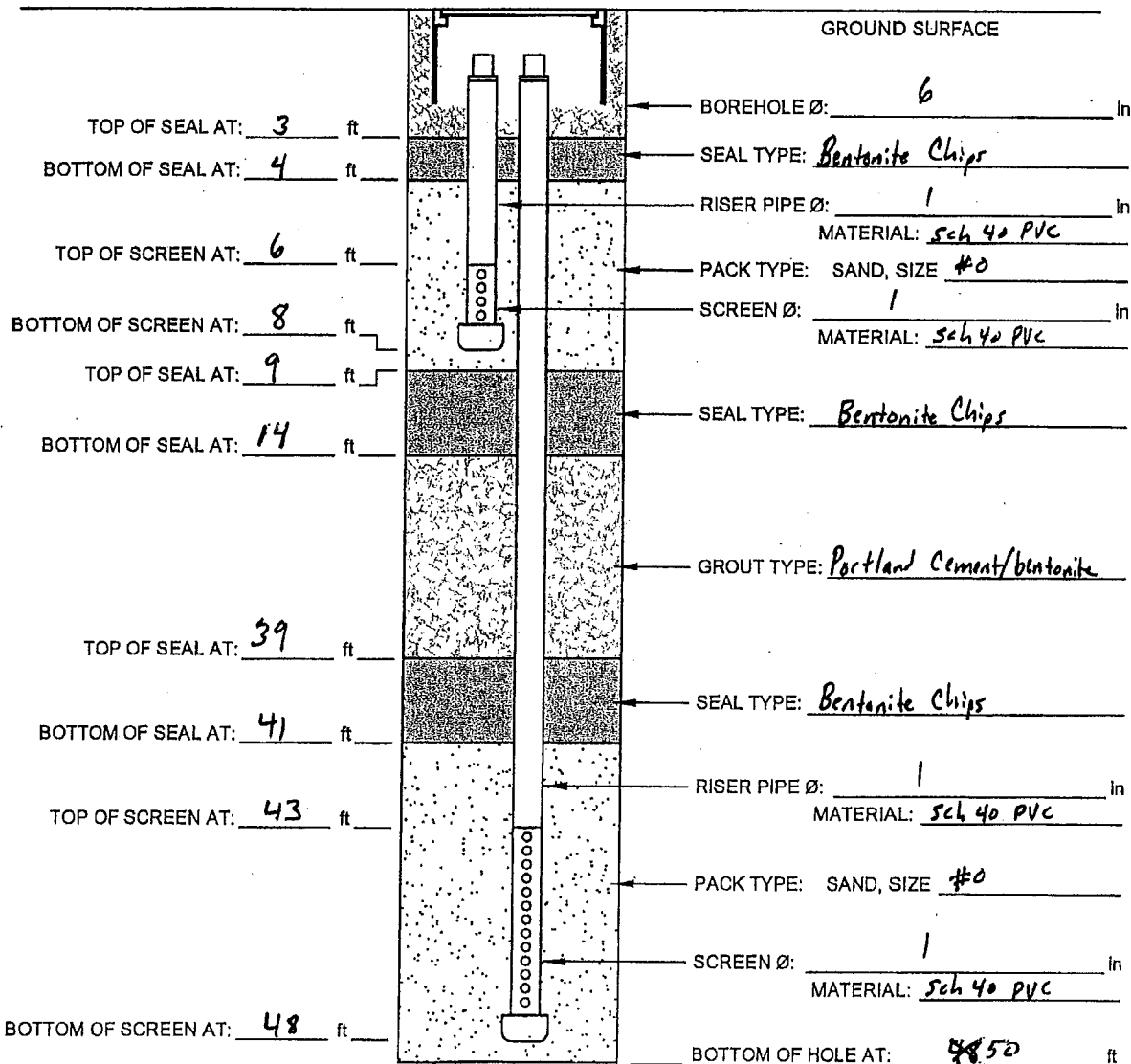
HOLE DIAMETER: 6"

DEVELOPMENT: METHOD: \_\_\_\_\_ DURATION: \_\_\_\_\_

# VADOSE ZONE MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHF  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: VZ-4  
 DATE COMPLETED: 4/30/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly

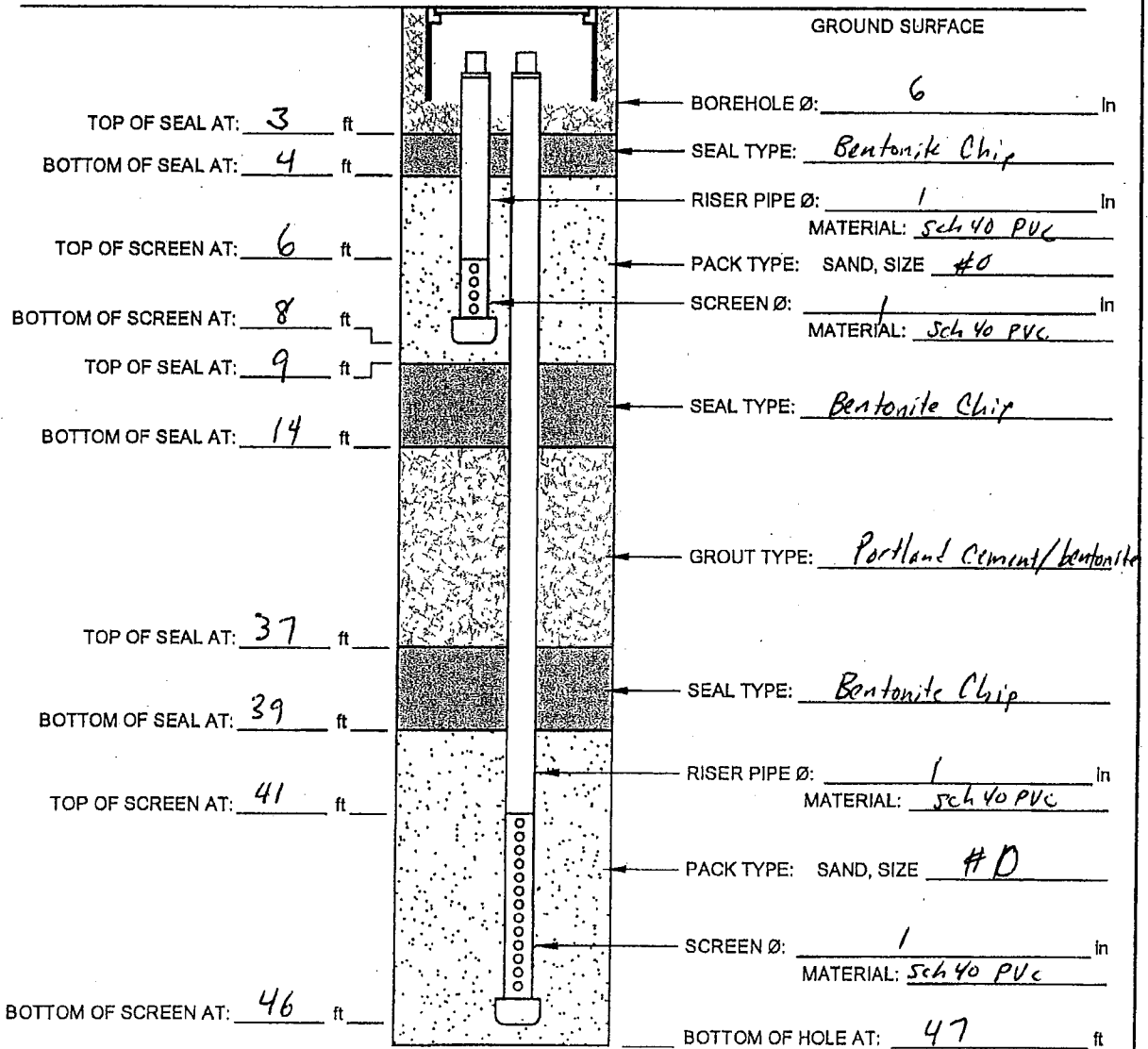


SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6  
 DEVELOPMENT: METHOD: \_\_\_\_\_ DURATION: \_\_\_\_\_

# VADOSE ZONE MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruess  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hecksville, NY

HOLE DESIGNATION: VZ-5  
 DATE COMPLETED: 3/11/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly

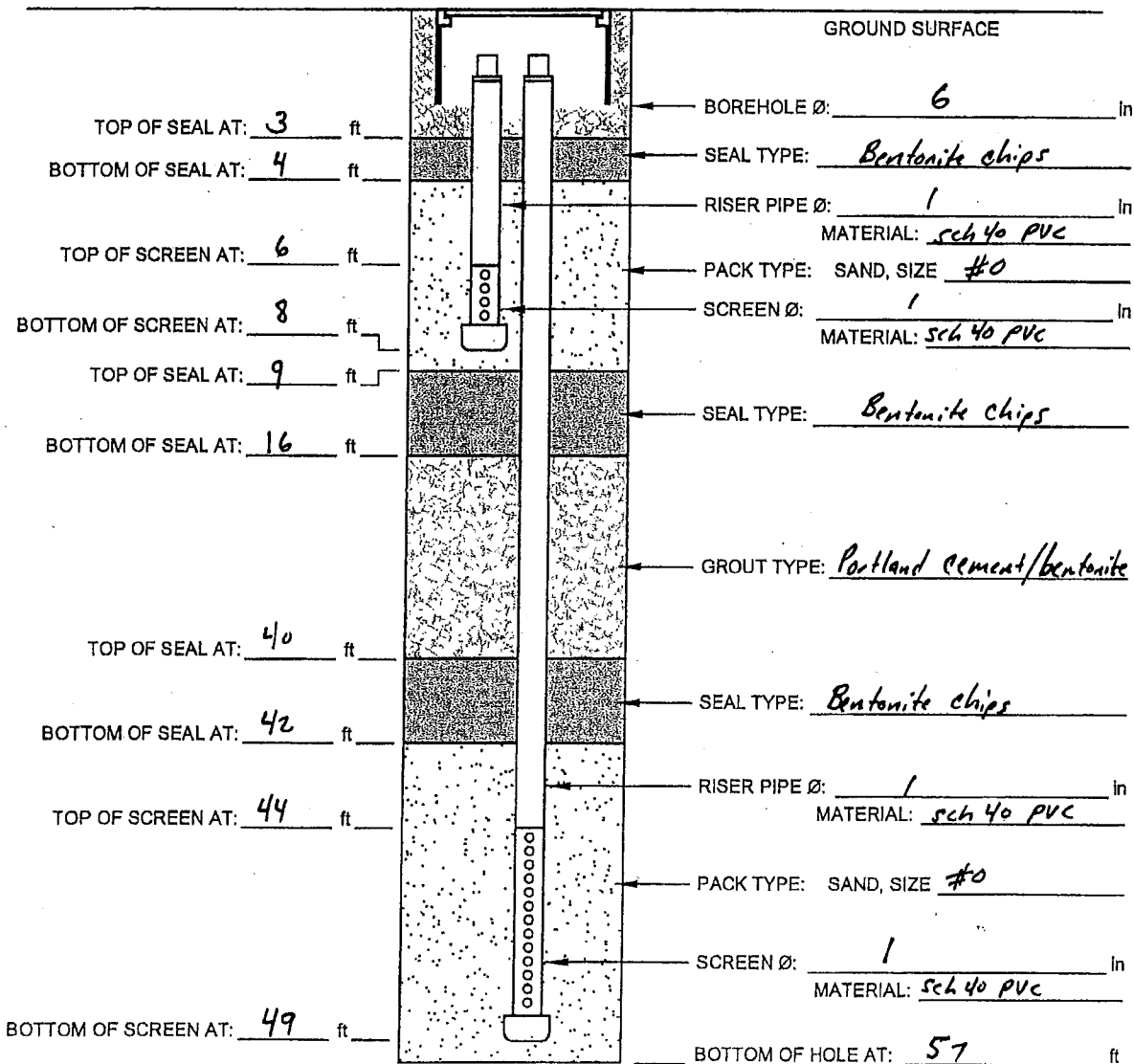


SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6  
 DEVELOPMENT: METHOD: — DURATION: —

# VADOSE ZONE MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: VZ-C  
 DATE COMPLETED: 2/26/11  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_  
 SCREEN MATERIAL: AIR: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_  
 HOLE DIAMETER: 6"  
 DEVELOPMENT: METHOD: \_\_\_\_\_ DURATION: \_\_\_\_\_



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 2

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

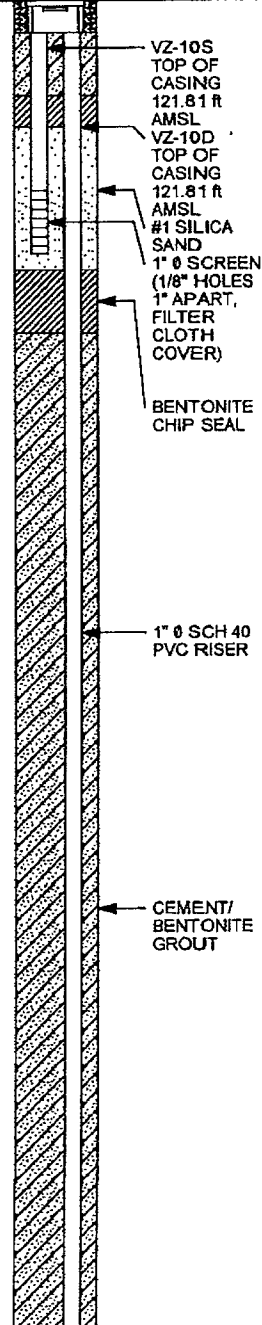
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: VZ-10

DATE COMPLETED: January 11, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
	GROUND SURFACE	121.90						
2	SILTY SAND, trace gravel, light brown, no odor		 <p>VZ-10S TOP OF CASING 121.81 ft AMSL</p> <p>VZ-10D TOP OF CASING 121.81 ft AMSL</p> <p>#1 SILICA SAND</p> <p>1" Ø SCREEN (1/8" HOLES 1" APART, FILTER CLOTH COVER)</p> <p>BENTONITE CHIP SEAL</p>					
4								
6	SAND AND GRAVEL, medium to coarse sand, fine gravel, dry, light brown and red brown, no odor	115.90						
8								
10								
12								
14								
16	SAND, trace silt, medium grained sand, light brown, moist, no odor	105.90						
18								
20								
22								
24								
26	- trace gravel at 26.0ft BGS							
28								
30								
32								
34								
36	CLAY, trace silt, stiff, dark brown	85.90						
38								
40								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/20/07





# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: VZ-10

DATE COMPLETED: January 11, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE			
				NUMBER	INTERVAL	REC (%)	'N' VALUE
44							
46	SAND, fine grained, light brown, moist, no odor	75.90					
48							
50							
52							
54							
56	CLAY, high plasticity, dark gray, wet, no odor	65.90					
58							
60	END OF BOREHOLE @ 60.0ft BGS	61.90					
62	STRATIGRAPHY OF VZ-10 FROM MW-83						
64							
66							
68							
70							
72							
74							
76							
78							
80							
82							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 2

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: VZ-11

DATE COMPLETED: February 28, 2006

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE			
				NUMBER	INTERVAL	REC (%)	N' VALUE
	GROUND SURFACE	121.35					
	TOPSOIL	121.18					
2	SAND AND GRAVEL, some silt, loose, fine to medium grained, orange-brown, no odor		VZ-11S TOP OF CASING 120.64 ft AMSL				
4			VZ-11D TOP OF CASING 120.60 ft AMSL				
6			#1 SILICA SAND				
8			1" Ø SCREEN (1/8" HOLES 1" APART, FILTER CLOTH COVER)				
10			BENTONITE CHIP SEAL				
12							
14							
16							
18							
20			1" Ø SCH 40 PVC RISER				
22							
24							
26							
28							
30			CEMENT/ BENTONITE GROUT				
32	SAND AND SILT, trace clay, firm, fine grained, light gray and orange	93.35					
34							
36							
38							
40	- loose, tan brown, no odor at 38.0ft BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: VZ-11

PROJECT NUMBER: 6883

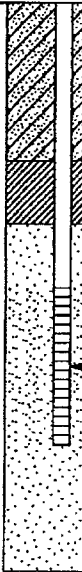
DATE COMPLETED: February 28, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S. DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
44								
46								
48								
50								
52								
54								
56								
58	SAND, loose, medium grained, tan brown and grayish brown	63.35						
60								
62								
64	END OF BOREHOLE @ 63.0ft BGS	58.35						
66	STRATIGRAPHY OF VZ-11 FROM IW-18							
68								
70								
72								
74								
76								
78								
80								
82								

**WELL DETAILS**  
Screened Interval:  
115.35 to 113.35ft AMSL  
6.00 to 8.00ft BGS  
Length: 2ft  
Diameter: 1in  
Slot Size: 125  
Material: SCH 40 PVC  
Seal:  
118.35 to 117.35ft AMSL  
3.00 to 4.00ft BGS  
Material: BENTONITE CHIPS  
Sand Pack:  
117.35 to 112.85ft AMSL  
4.00 to 8.50ft BGS  
Material: #1 SILICA SAND  
  
Screened Interval:  
70.35 to 65.35ft AMSL  
51.00 to 56.00ft BGS  
Length: 5ft  
Diameter: 1in  
Slot Size: 125  
Material: SCH 40 PVC  
Seal:  
74.35 to 72.35ft AMSL  
47.00 to 49.00ft BGS  
Material: BENTONITE CHIPS  
Sand Pack:  
72.35 to 61.35ft AMSL  
49.00 to 60.00ft BGS  
Material: #1 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GOT 1/30/07

# VADOSE ZONE MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco

HOLE DESIGNATION: V2-12

PROJECT No: 6883

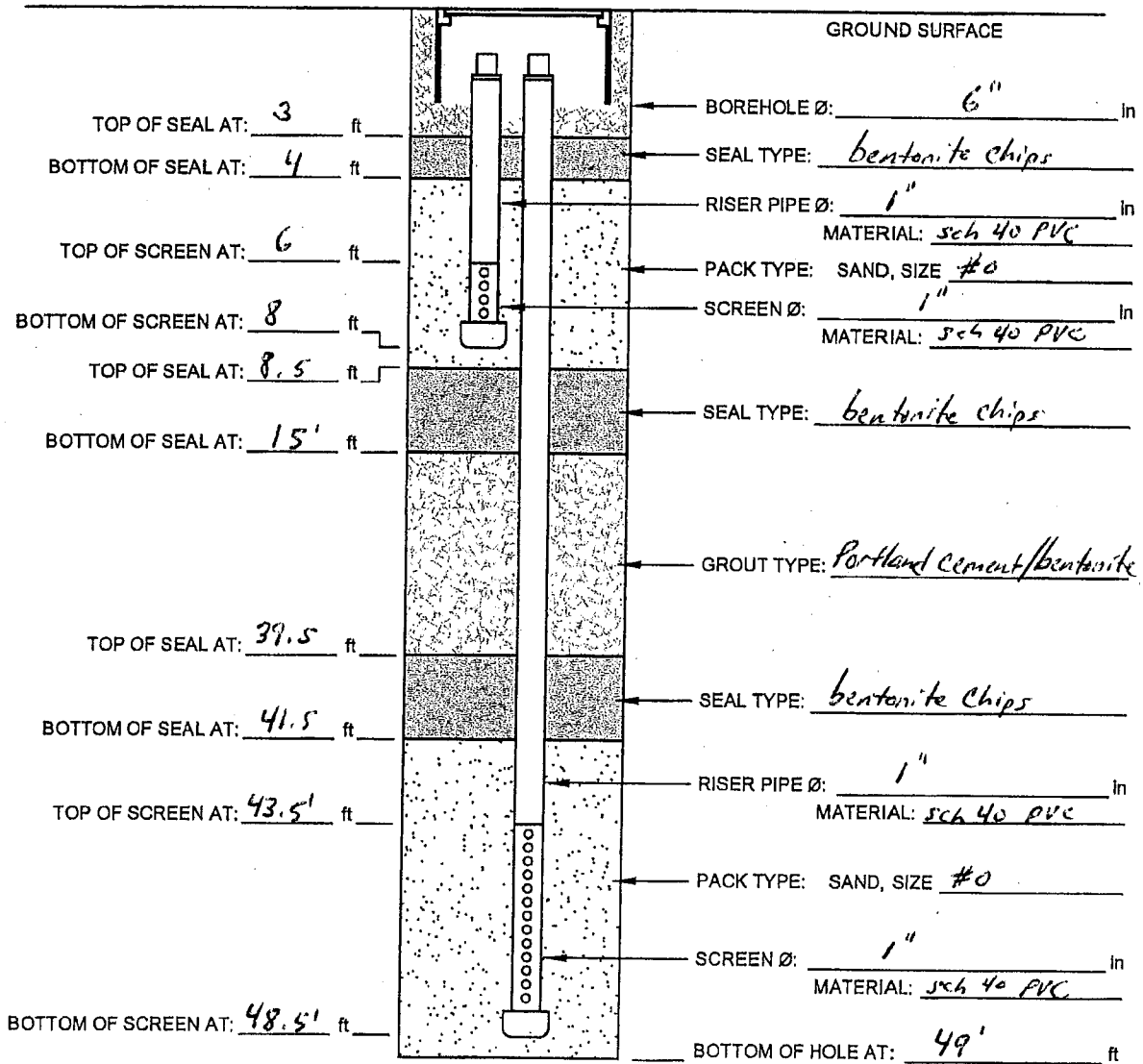
DATE COMPLETED: 12/8/10

CLIENT: GS4I

DRILLING METHOD: Sonic

LOCATION: Hicksville, NY

CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: AIR: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6"

DEVELOPMENT: METHOD: — DURATION: —



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 2

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

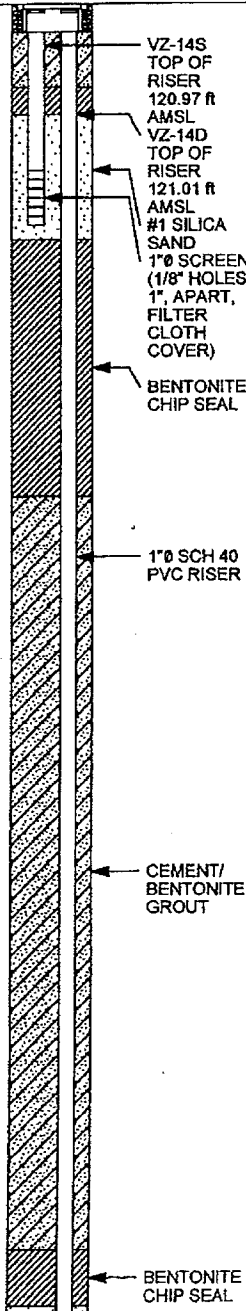
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: VZ-14

DATE COMPLETED: October 7, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE			
				NUMBER	INTERVAL	REC (%)	'N' VALUE
	GROUND SURFACE	121.32					
2	SILTY SAND, trace gravel, light brown, no odor						
4							
6	SAND AND GRAVEL, trace silt, fine to medium grained sand, medium to coarse grained gravel, light brown, dry, no odor	116.32					
8	- no silt, medium to coarse grained sand, medium to very coarse grained gravel at 7.0ft BGS						
10							
12							
14							
16							
18	- trace silt, orange-brown at 17.0ft BGS						
20							
22							
24	SAND, trace silt, trace gravel, medium grained sand, medium to very coarse gravel, light brown, dry, no odor	97.32					
26	- no silt, medium to coarse grained gravel, light brown and orangish brown at 27.0ft BGS						
28							
30							
32							
34							
36							
38	SAND AND SILT, fine grained, reddish brown, moist, no odor	84.32					
40	- light gray clay lens from 38.0 to 39.0ft BGS						
42							
44							
46							
	SAND, fine to medium grained, light brown, gray	74.32					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

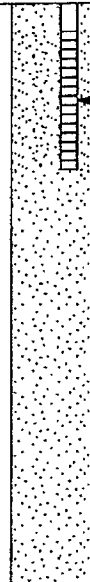
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: VZ-14

DATE COMPLETED: October 7, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE			
				NUMBER	INTERVAL	REC (%)	'N' VALUE
50	areas, moist, no odor		 <p>1" SCREEN (1/8" HOLES 1" APART, FILTER CLOTH COVER) #1 SILICA SAND</p>				
52							
54							
56		64.32					
58	CLAY, high plasticity, brownish gray and dark brown, moist						
60							
62							
64	SW - SAND, fine to medium grained, light brown, orange mottles, moist, no odor	58.32					
66							
68							
70	END OF BOREHOLE @ 69.0ft BGS	52.32					
72	STRATIGRAPHY OF VZ-14 FROM MW-87		<p><u>WELL DETAILS</u> Screened interval: 115.32 to 113.32ft AMSL 6.00 to 8.00ft BGS Length: 2ft Diameter: 1in Slot Size: 125 Material: SCH 40 PVC Seal: 118.32 to 117.32ft AMSL 3.00 to 4.00ft BGS Material: BENTONITE CHIPS Sand Pack: 117.32 to 112.82ft AMSL 4.00 to 8.50ft BGS Material: #1 SILICA SAND</p> <p>Screened Interval: 72.32 to 87.32ft AMSL 49.00 to 54.00ft BGS Length: 5ft Diameter: 1in Slot Size: 125 Material: SCH 40 PVC Seal: 76.32 to 74.32ft AMSL 45.00 to 47.00ft BGS Material: BENTONITE CHIPS Sand Pack: 74.32 to 52.32ft AMSL 47.00 to 69.00ft BGS Material: #1 SILICA SAND</p>				
74							
76							
78							
80							
82							
84							
86							
88							
90							
92							
94							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG: 6883.GPJ, CRA, CORP, GDT, 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 2

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: VZ-15

PROJECT NUMBER: 6883

DATE COMPLETED: November 4, 2005

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
	GROUND SURFACE	121.46						
	topsoil	120.46						
2	SAND AND GRAVEL, some silt, light brown, medium coarse grained sand and gravel, no odour	120.46						
4								
6								
8								
10								
12								
14								
16								
18								
20								
22								
24								
26	SAND, medium grained, light brown, no odor	106.46						
28								
30								
32								
34								
36								
38								
40								
42								
44								
	- fine-medium grained sand, tan brown, no odor at 29.0ft BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07



# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: HOOKER/RUCO SITE

PROJECT NUMBER: 6883

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

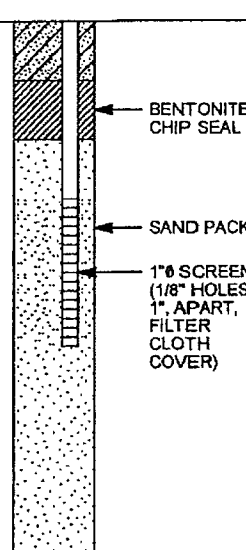
LOCATION: HICKSVILLE, NY

HOLE DESIGNATION: VZ-15

DATE COMPLETED: November 4, 2005

DRILLING METHOD: 6" ID ROTASONIC

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE			
				NUMBER	INTERVAL	REC (%)	'N' VALUE
46	- clay lens from 45.0 to 46.0ft BGS						
48		72.46					
50	SAND AND SILT, fine to medium grained sand, tan brown and light gray, orange mottles						
52							
54							
56							
58	SAND, medium grained, light brown, no odor	63.46					
60							
62	CLAY, trace silt, stiff, dark gray	60.46					
64	END OF BOREHOLE @ 63.0ft BGS	58.46					
66	STRATIGRAPHY OF VZ-15 FROM MW-81		<p><u>WELL DETAILS</u> Screened Interval: 115.46 to 113.46ft AMSL 6.00 to 8.00ft BGS Length: 2ft Diameter: 1in Slot Size: 125 Material: SCH 40 PVC Seal: 118.46 to 117.46ft AMSL 3.00 to 4.00ft BGS Material: BENTONITE CHIPS Sand Pack: 117.46 to 108.96ft AMSL 4.00 to 12.50ft BGS Material: #1 SILICA SAND</p> <p>Screened interval: 70.46 to 65.46ft AMSL 51.00 to 56.00ft BGS Length: 5ft Diameter: 1in Slot Size: 125 Material: SCH 40 PVC Seal: 74.46 to 72.46ft AMSL 47.00 to 49.00ft BGS Material: BENTONITE CHIPS Sand Pack: 72.46 to 58.46ft AMSL 49.00 to 63.00ft BGS Material: #1 SILICA SAND</p>				
68							
70							
72							
74							
76							
78							
80							
82							
84							
86							
88							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 6883.GPJ CRA CORP GDT 1/30/07







# STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: HOOKER/RUCO SITE

HOLE DESIGNATION: VZ-16

PROJECT NUMBER: 6883


DATE COMPLETED: January 23, 2006

CLIENT: MILLER SPRINGS REMEDIATION MANAGEMENT INC.

DRILLING METHOD: 6" ID ROTASONIC

LOCATION: HICKSVILLE, NY

FIELD PERSONNEL: S.DALY

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	GAS WELL NEST	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
44			 <p>BENTONITE CHIP SEAL</p> <p>SAND PACK</p> <p>1" Ø SCREEN (1/8" HOLES 1" APART, FILTER CLOTH COVER)</p>					
46	SAND, loose, fine-medium sand, tan brown	74.42						
48								
50	- light grey clay, stiff at 50.0ft BGS							
52	- light grey medium sand, loose at 52.0ft BGS							
54								
56	SAND, loose, medium sand, light grey	64.42						
58								
60	END OF BOREHOLE @ 60.0ft BGS							
62	STRATIGRAPHY OF VZ-16 FROM MW-88							
64		55.42	<p><u>WELL DETAILS</u> Screened interval: 114.42 to 112.42ft AMSL 6.00 to 8.00ft BGS Length: 2ft Diameter: 1in Slot Size: 125 Material: SCH 40 PVC Seal: 117.42 to 116.42ft AMSL 3.00 to 4.00ft BGS Material: BENTONITE CHIPS Sand Pack: 118.42 to 111.92ft AMSL 4.00 to 8.50ft BGS Material: #1 SILICA SAND</p> <p>Screened interval: 69.42 to 64.42ft AMSL 51.00 to 56.00ft BGS Length: 5ft Diameter: 1in Slot Size: 125 Material: SCH 40 PVC Seal: 73.42 to 71.42ft AMSL 47.00 to 49.00ft BGS Material: BENTONITE CHIPS Sand Pack: 71.42 to 60.42ft AMSL 49.00 to 60.00ft BGS Material: #1 SILICA SAND</p>					
66								
68								
70								
72								
74								
76								
78								
80								
82								

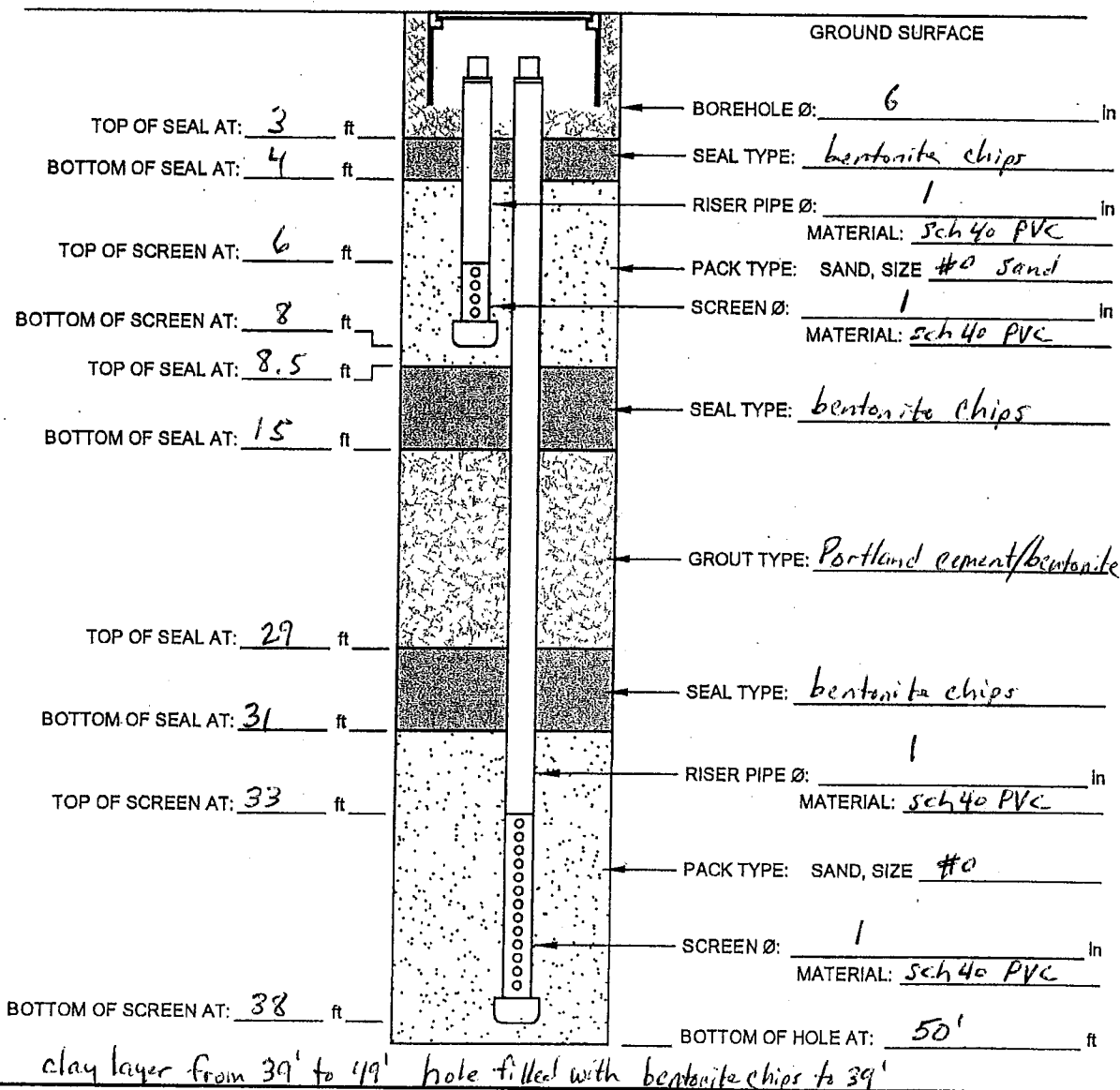
OVERBURDEN LOG 6883.GPJ CRA CORP.GDT 1/30/07

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

# VADOSE ZONE MONITORING WELL INSTRUMENTATION LOG

PROJECT NAME: Hooker Ruco  
 PROJECT No: 6883  
 CLIENT: GSHI  
 LOCATION: Hicksville, NY

HOLE DESIGNATION: VZ-17  
 DATE COMPLETED: 12/20/10  
 DRILLING METHOD: Sonic  
 CRA SUPERVISOR: S. Daly



SCREEN TYPE: AIR: ☒ Continuous Slot ☐ Perforated ☐ Louvre ☐ Other: \_\_\_\_\_

SCREEN MATERIAL: AIR: ☐ Stainless Steel ☒ PVC ☐ Other: \_\_\_\_\_

HOLE DIAMETER: 6"

DEVELOPMENT: METHOD: \_\_\_\_\_ DURATION: \_\_\_\_\_

## APPENDIX C

### CERTIFICATES

STATE OF NEW YORK  
PUBLIC SERVICE COMMISSION

At a session of the Public Service  
Commission held in the City of  
Albany on November 8, 2006

COMMISSIONERS PRESENT:

William M. Flynn, Chairman  
Patricia L. Acampora  
Maureen F. Harris  
Robert E. Curry, Jr.  
Cheryl A. Buley

CASE 06-W-0964 - Joint Petition of Northrop Grumman Corporation  
and Northrop Grumman Systems Corporation for a  
Declaratory Ruling That Public Service  
Commission Approval is Not Required for  
Providing Limited Water Service to Occidental  
Petroleum Corporation in Connection with its  
Groundwater Remediation Plan.

ORDER GRANTING EXEMPTIONS  
FROM WATER REGULATION

(Issued and Effective November 13, 2006)

BY THE COMMISSION:

SUMMARY

Northrop Grumman Corporation (NGC) and Northrop  
Grumman Systems Corporation (NGSC) (collectively, the joint  
petitioners) seek a declaratory ruling that the provision of  
limited water service to Occidental Petroleum Corporation  
(Occidental) does not need formal approval. If such request is  
denied, the joint petitioners request approval for the provision  
of such limited water service. We deny the request for a  
declaratory ruling and approve the joint petitioners' request to  
provide limited water service, with attendant lightened  
regulation, to Occidental.

BACKGROUND

In a Joint Petition filed on August 8, 2006, NGC and NGSC request a declaratory ruling that the provision of limited water service to Occidental) in connection with Occidental's groundwater remediation plan for the Hooker Chemical/Ruco Polymer Superfund Site (Hooker Chemical Site) vinyl chloride plume does not require formal approval. The joint petitioners seek, in the alternative, approval for the provision of such water service to Occidental.

In 2004, NGC and NGSC made a similar request for the provision of limited water service to Calpine Eastern Corporation (Calpine).<sup>1</sup> In the October 2004 Order, we determined that the proposed water provision to Calpine qualified NGC and NGSC for exemptions from accounting, reporting and filing requirements under Public Service Law (PSL) §89-c(11). NGC and NGSC remain subject to the Public Service Law with respect to such matters as safety, customer complaints, enforcement, investigation and reliability. We also required NGC and NGSC to obtain approval prior to the provision of water services to users other than those approved under the October 2004 Order.

The Joint Petition

NGC and NGSC state that NGC is a major defense contractor, with annual revenues in 2005 of more than \$30 billion, specializing in the manufacturing of aerospace and electronic equipment and products. NGSC is a wholly-owned subsidiary of NGC that operates and maintains the systems necessary to support the manufacturing and other operations of NGC on its sites in the United States.

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<sup>1</sup> Case 04-W-0886, Joint Petition of Northrop Grumman Corporation and Northrop Grumman Systems Corporation, Order Granting Exemptions from Water Regulation (issued October 27, 2004) (October 2004 Order).

Occidental is responsible for the remediation of the Hooker Chemical Site located in Hicksville, New York, including the associated groundwater plume which runs beneath a Bethpage site where NGC has wells that serve. In order to implement its remediation plan, Occidental purchased a small parcel of the Bethpage site from NGC and installed a control building. Its remediation plan's primary objective is to deliver oxygen into the impacted zone of the aquifer. Once this oxygen is introduced and comes into contact with the vinyl chloride, the microorganisms residing in the groundwater will be stimulated and will biodegrade the vinyl chloride plume which emanates from the Site.

The joint petitioners note that the groundwater extracted from NGC's wells on the Bethpage site as part of its remediation program administered by the New York State Department of Environmental Conservation (DEC) would normally be discharged to surface recharge basins located on that site. This water is processed through an air stripper and is saturated with oxygen. The joint petitioners propose to provide this oxygenated water to Occidental to assist Occidental in fulfilling the requirements of its remediation plan. The joint petitioners assert that NGC is required to return as much of the extracted groundwater as possible back into the formation from which it originated. Thus, the provision of this water to Occidental in relation to the remediation plan would simply be a different means of returning NGC's water to the formation in which it originated.

According to the joint petitioners, discussions between Occidental, NGC, the United States Environmental Protection Agency (EPA) and the DEC have resulted in all parties supporting NGC's plan to provide limited water service to Occidental to help implement Occidental's remediation plan. The use of NGC's oxygenated water for the specific purpose proposed

by the joint petitioners was agreed to by both the EPA and the DEC.

The EPA-approved remediation plan relies on an injection rate of oxygenated water into the plume at the rate of approximately four gallons per minute (gpm). This equals approximately 7,000 gallons per day and comprises approximately five minutes of the total volume of water extracted by NGC's from two of the wells in any given 24-hour day. The joint petitioners have agreed to make additional water (up to 15 gpm with a maximum provision of 20 gpm) available to Occidental as needed.

The joint petitioners note that Wells 1 and 3, the source of the oxygenated water proposed to be delivered to Occidental, are the same sources that the joint petitioners use to supply Calpine. The proposed delivery of oxygenated water to Occidental will not affect the joint petitioners' ability to meet their water supply obligations to Calpine.

NGC and NGSC assert that they will not install any new systems or water delivery facilities in connection with the proposed provision of water to Occidental. A meter will be installed at Occidental's control building on the Bethpage site to ensure that the quantity of water delivered is consistent with Occidental's remediation plan. The joint petitioners state that they will not charge Occidental for the provision of oxygenated water and that they have no intention of expanding the provision of water beyond those services provided to Calpine and Occidental. The joint petitioners reaffirm that their water supply operations remain wholly incidental and subsidiary to their primary business.

#### PUBLIC NOTICE

Notice of the petition was published in the State Register on September 6, 2006, in conformance with State



Administrative Procedure Act §202(1). The comment period expired on October 23, 2006. No comments have been submitted.

DISCUSSION AND CONCLUSION

The joint petitioners' request for a declaratory ruling that the proposed provision of limited water service to Occidental does not require formal approval is denied. The provision of limited water services, with attendant lightened regulation, requires us to determine if the water utility operations are incidental and subsidiary to the primary business of the entity seeking such lightened regulation. Additionally, since such lightened regulation does not exempt the entity providing the limited water service from complying with other provisions of the Public Service Law, it is necessary for us to be apprised of the provision of such limited water service. Thus, the joint petitioners must obtain formal approval for the provision of water service.

Although the joint petitioners' request for a declaratory ruling is denied, we approve the request for the provision of limited water service and find that such provision to Occidental qualifies for exemptions from accounting, reporting and filing requirements under PSL §89-c(11). However, the joint petitioners shall remain subject to the Public Service Law in relation to matters such as safety, customer complaints, enforcement, investigation, and reliability.

Under §89-c(11), a business that operates water plant may be exempted from record-keeping and filing requirements if its water utility operations are subsidiary and incidental to its primary business. The joint petitioners' furnishing of water to Occidental is incidental and subsidiary to their primary businesses. Therefore, pursuant to §89-c(11), NGC and NGSC shall be exempted from keeping accounts, records, and books; from the filing of annual reports; and, from the filing

of rate schedules and tariffs, on water service provided to Occidental. This exemption from regulation is similar to exemptions granted other entities, providing service incidental to a primary business.<sup>2</sup>

Additionally, it is appropriate to continue to apply the Indeck-Olean approach when analyzing proceedings such as this.<sup>3</sup> In that case, Indeck-Olean Limited Partnership (IOLP) filed a petition requesting that it be lightly regulated in regard to its steam production and service pursuant to PSL §80(11). In analyzing that request, we also addressed the need for consumer protections between IOLP and the Dresser-Rand Company, the recipient of IOLP's steam service. As we explained:

[The parties] have negotiated, at arm's length, a binding contract governing steam sales. Interference with that contract, which establishes the relationship between two sophisticated business entities, would serve no regulatory purpose. Therefore, it is not necessary under these circumstances to impose conditions to protect consumer interests.<sup>4</sup>

The conclusion reached in the Indeck-Olean Case is applicable to the NGC and NGSC petition. NGC, NGSC and Occidental may be considered sophisticated business entities

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<sup>2</sup> Case 02-W-0742, Independent Water Works, Inc. - Initial Tariff Filing, Untitled Order (issued November 22, 2002); Case 02-W-1154, Rochester Technology Park Utility Company LLC - Request for a Declaratory Ruling, Order Granting Exemptions from Water Regulation (issued December 23, 2002); Case 04-W-0886, supra.

<sup>3</sup> Case 00-M-2231, Indeck-Olean Limited Partnership - Request for a Declaratory Ruling and for a Certificate of Public Convenience and Necessity, Order Providing for Lightened Regulation and Granting a Certificate of Public Convenience and Necessity to Produce and Deliver Steam (issued May 2, 2001).

<sup>4</sup> Case 00-M-2231, supra, pp. 11-12.

capable of negotiating a binding contract for the limited provision of water service. Based on their level of sophistication, there is no need to impose consumer protections on this limited water service.

The Commission orders:

1. NGC's and NGSC's request for a declaratory ruling is denied.
2. NGC and NGSC are authorized to provide limited water service to Occidental Petroleum Corp., as discussed in the body of this Order.
3. NGC and NGSC are exempted from complying with the accounting, reporting, and filing requirements of PSL §89-c(11) in relation to their provision of water service to Occidental Petroleum Corporation. NGC and NGSC shall otherwise comply with the requirements of the Public Service Law as discussed in the body of this Order.
4. Northrop Grumman Corporation and Northrop Grumman Systems Corporation must obtain Commission approval for provision of water service to entities other than Calpine Eastern Corporation or Occidental Petroleum Corporation.
5. This proceeding is closed.

By the Commission,

(SIGNED)

JACLYN A. BRILLING  
Secretary

***Electrical Inspectors, Inc.***

308 East Meadow Avenue  
East Meadow, NY 11554  
Office: (516) 794-0400 (631)396-7474  
Fax: (516) 794-5854  
Website: [www.electricalinspectors.com](http://www.electricalinspectors.com)  
Email: [info@electricalinspectors.com](mailto:info@electricalinspectors.com)

Certificate Number: **05-9121**

Municipality: Oyster Bay, Town of

Inspector: 123

Issue Date: 7/7/2006

Mail To:

JVR Electric  
Steve LaSala  
262 Middle Island Road  
Medford, NY 11763

Property Address:

Miller Springs Remediation Management  
70 Hazel Sreet  
Hicksville, NY 11801

License#: 784

**ELECTRICAL APPROVAL CERTIFICATE**

Section: 46 Block: 503 Lot: 3

**AREAS LISTED BELOW ARE APPROVED BY INSPECTION**

**AND FOUND TO BE IN COMPLIANCE WITH THE NATIONAL ELECTRIC CODE**

No visual defects were found for the electrical inspection provided. No obvious unsatisfactory conditions were found in the areas herein below only.

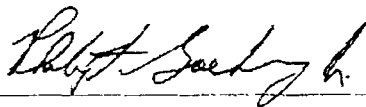
*Commercial Inspection*

14- 2 Light 32 Vaportight Fluorcents, 7- 175 Watt Metal Halides, 18- 20Amp 120V Duplex Receptacles, 6- 2 Head Emergency Lights, 2- Exit Lighis, 2- 480V 2HP Exhaust Fans, 2- 408V 5KW Unit Heaters  
4- Injection Wells Each With The Following Electric: 1- 480V 30Amp Disconnect, 5- 120V 20Amp Circuits, 1- 2KVA Transformer, 50Ft. 120V 1.5KW Heat Tape  
400Amp 277/480V Underground Service Upgrade/CB/1 Meter, 400Amp Three Phase Main Panel/36Ckts/27 Used.\*

*Amended Certificate/ML*

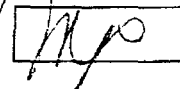


Richard M. Bivone  
President



Philip F. Goehring  
Chief Electrical Inspector

Not valid unless signed by an  
authorized EII Agent





# Certificate of Approval of Plumbing

Town of Oyster Bay Department of Planning and Development

Division of Building, 74 Audrey Avenue, Oyster Bay, New York 11771

No. **6 47321**  
08/01/2006

<b>Property Owner Information</b>									
MILLER SPRINGS REMEDIATION MGT INC, 2480 FORTUNE DR. #300 LEXINGTON, KY 40509									
<b>Property Information:</b>									
SD		Section		Block		Lot(s)		Zone	
21		46		503		3		LI	
Located on		Side of		Feet		of		Post Office	
SW		SOUTH OYSTER BAY		0.00000		HAZEL STREET		HICKSVILLE	
<b>Plumber/Contractor Info:</b>									
MUHS, PAUL E.									
<b>Address of Installation:</b>									
SW CORNER S.OYSTER BAY & HAZEL ST HICKSVILLE, NY 11801									
Appl. No.	Permit No.	Permit Date	Gas/Oil/Plb.	Gas/Oil Date	Sewer No.	Sewer Date	Receipt No.	Insp	Date
2535	R35495	11/10/2005		//		//	H283014	MB	07/28/2006

## Work Completed

R35495 - Three (3) Plumbing Fixtures (1-WC, 1-LAV, 2-FD) and Two (2) Gas-Fired Heaters

This certifies that the above Plumbing and Drainage installed under the above Permit meets the requirements of the Plumbing code of the Town of Oyster Bay.

DPD Certificate of Approval of Plumbing - Owner's Copy

*Jack A. Libert*  
Commissioner, Department of Planning and Development

initials



# Certificate of Occupancy

Town of Oyster Bay Department of Planning and Development

Division of Building, 74 Audrey Avenue, Oyster Bay, New York 11771

No. A 59779  
01/11/2007

MILLER SPRINGS REMEDIATION MGT INC, 2480 FORTUNE DR. #300 LEXINGTON, KY 40509

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SOUTH OYSTER BAY

0.00000

HAZEL STREET

HICKSVILLE

SW CORNER S.OYSTER BAY & HAZEL ST HICKSVILLE, NY 11801

Appl. No.	Permit No.	Permit Date	Receipt No.	Z.B.A. No.	Date	Town Board No.	Date	CA No.	Elec No.
2535	R35495	11/10/2006	H283014		//		//	G47321	06-9121

## Work Completed

R35495-A 28' x 38' one (1) story (Type 2b)(Non-Fire Sprinklered)(F-2) pre-engineered metal (Structural Steel Rigid Framed) building to accommodate use for "BIOSPARGE TREATMENT SYSTEM" (F-2) tenancy.

This certifies that the above construction conforms with the approved plans and codes of the Town of Oyster Bay and the New York State Fire Prevention and Building Code.

TOBDPD Certificate of Occupancy - Owner's Copy

*John A. Schmitt*  
Commissioner, Department of Planning and Development

Initials

6883

THOMAS R. SUOZZI  
COUNTY EXECUTIVE



AUG 11 2006

RAYMOND A. RIBEIRO, P.E.  
COMMISSIONER

**COUNTY OF NASSAU  
DEPARTMENT OF PUBLIC WORKS**  
1194 Prospect Avenue  
Westbury, New York 11590-2723

August 7, 2006

Mr. Stephen A. Whyte  
Miller Springs Remediation Management, Inc.  
2480 Fortune Drive  
Lexington, KY 40509

**Re: Acceptance of Air Compressor Condensate Water from Biosparge System  
Control Building, Hicksville, NY to the Nassau County Sanitary Sewer.**

Dear Mr. Whyte:

Your request, as stated in your letter of August 1, 2006, to discharge air compressor condensate water to the Nassau County sanitary sewer from the above referenced location has been reviewed and is approved.

This approval is based on the innocuous nature of the waste as confirmed by our analysis and the minor volumes proposed for discharge (less than 430 gallons per week).

Thank you for your concern and cooperation. If you have any questions concerning this matter, please feel free to contact me at (516)571-7352.

Very truly yours,

A handwritten signature in cursive script, reading "Vincent J. Alonge".

Vincent J. Alonge  
Sewage Treatment Chemist III

C: Richard Cotugno